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ELECTRICAL WORLD

JUNE 21, 1930

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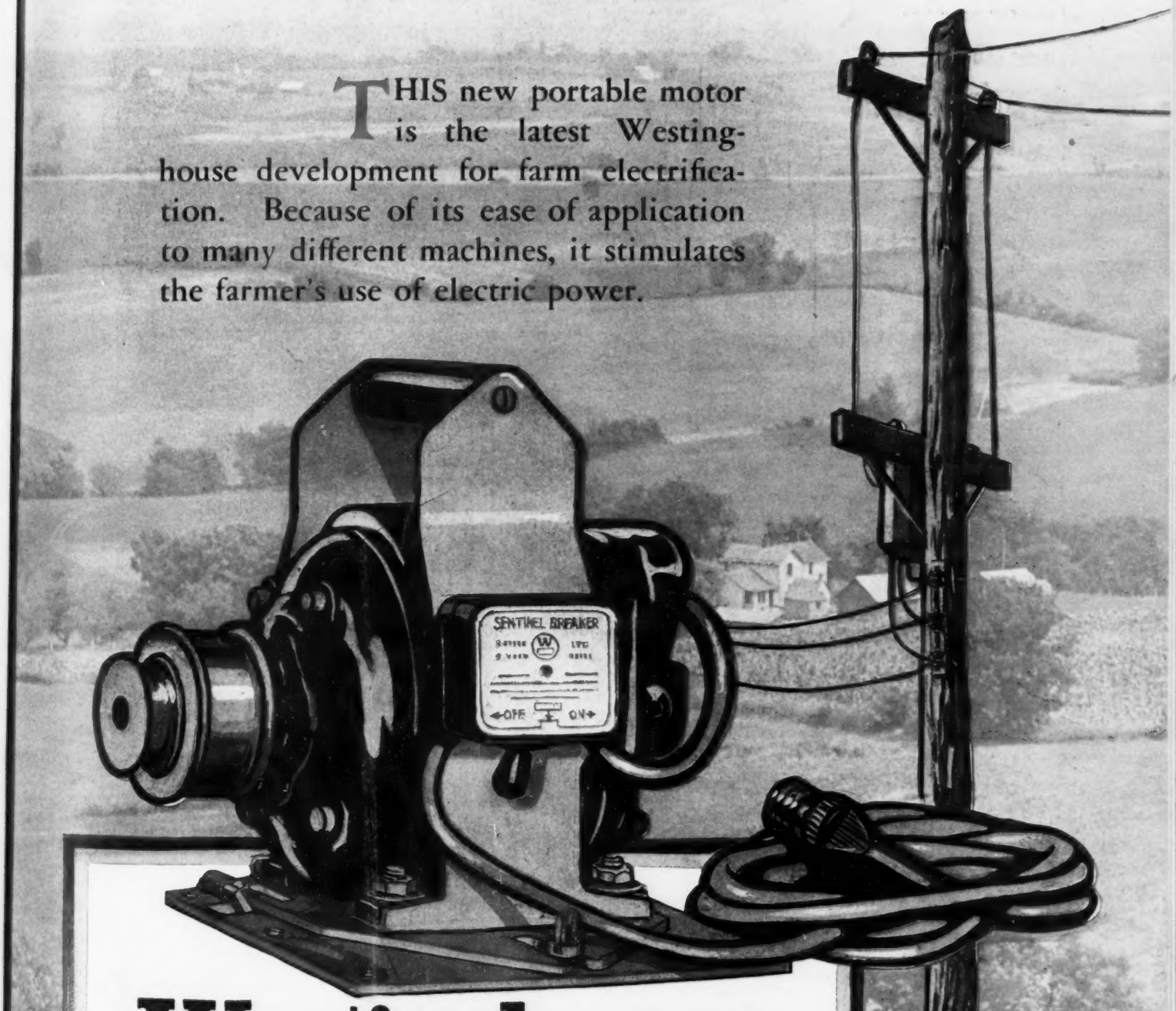

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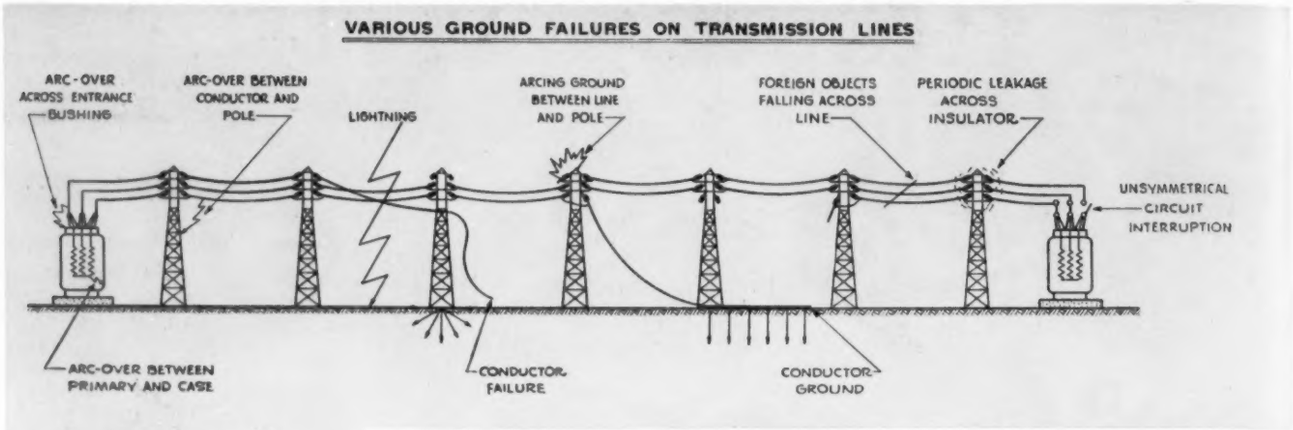

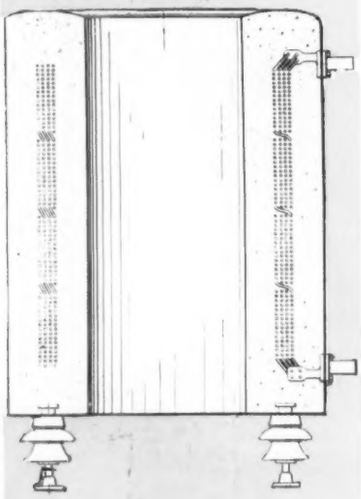

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JUNE 21, 1930

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VOLUME 95 . . . NUMBER 25

What Happened this Week at N.E.L.A. San Francisco Convention

Offsetting Reduced Capital Turnover and Securing Sane Regulation . . . . . M. S. SLOAN 1250

Policies on Consolidation and Regulation . . . . . P. S. ARKWRIGHT 1253

Regulatory Problems and Holding Companies

W. A. PRENDERGAST, 1255
B. F. WEADOCK, 1303
M. J. INSULL, 1269
W. J. HAGENAH, 1293
E. N. HURLEY, 1300

Commercial Opportunities

W. A. JONES, 1277
E. WHITEHORNE, 1297
M. J. INSULL, 1267
E. GRUHL, 1265
A. W. ROBERTSON, 1262
M. S. WINDER, 1291
V. M. F. TALLMAN, 1289

Creating Public Confidence

J. F. OWENS, 1263
HARRY REID, 1282
F. W. SARGENT, 1295
MERLE THORPE, 1302

Relation of Accountants to Management

F. T. GRIFFITH, 1285

Conditions Affecting Engineering

A. H. KEHOE, 1258
A. D. BAILEY, 1281
A. H. MARKWART, 1271
F. B. LEWIS, 1298

Awards and Prizes 1274, 1284

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ELECTRICAL WORLD

for the Week Ending

June 21, 1930

N.E.L.A. meets in San Francisco

Couzens bill at last goes to Hoover

World Power Conference in Berlin

Elmer Ambrose Sperry passes on

—COPPER, from custom smelters only, touched 11¼ cents on Wednesday. Rally from lowest price since 1914 came quickly with improved demand. Producers maintain 12-cent level for standard grade.

—STEAM POWER is to further restrict hydro developments in opinion of West Coast executives, who marshal facts and figures to substantiate their conclusions.

—DISTRIBUTION costs receive major consideration in N.E.L.A. engineering session. How to reduce them is the problem. Prospects appear encouraging.

—WORLD POWER Conference lacks harmony as Ambassador Sackett, once utility president, has tilt with Samuel Insull over paper he planned to present and did. Result, more publicity for subject in daily press than for all the rest of the conference.

—REGULATION dominates public policy session of N.E.L.A. "No utility company and no community should be subjected to the conflicts and confusion of double regulation," says P. S. Arkwright.

—ELMER A. SPERRY, citizen extraordinary, completes an active and versatile life. Prolific inventor, gentleman and benefactor to society, he left his mark in many fields.

—BOILERS of greater strength and higher steaming capacity presaged as American Society of Mechanical Engineers discusses embrittlement and creep at Detroit meeting.

—N.E.L.A. and World Power groups hold session heard round the world as greatest of radio hook-ups smashes time and distance barriers and brings San Francisco-Berlin meetings to uncounted millions.

NEWS OF THE WEEK

Berlin Power Conference Draws an Attendance of 4,000

By Cable to the ELECTRICAL WORLD
BERLIN, June 18.

WHEELS of the second plenary World Power Conference began to turn at Berlin on June 12 and 13 when the International Executive Council met to complete plans for the plenary sessions. Chairman D. N. Dunlop of England was absent because of illness, and his place was taken by Dr. Edward Tissot of Switzerland, vice-chairman of the council and chairman of the Swiss committee. Twenty-one countries were represented—Switzerland, Italy, Spain, France, Norway, Russia, Brazil, Poland, Germany, Austria, Dutch East Indies, Sweden, Great Britain, the Gold Coast, Canada, Denmark, Chile, Latvia, Japan, China and the United States.

O. C. Merrill, chairman of the American committee, formally presented an invitation to hold the third plenary meeting in the United States in 1936.

On Sunday evening, June 14, a reception was given to the delegates by Dr. von Miller, honorary president of the conference; Dr. Carl Koettgen, chairman of the German committee, and Lord Derby of England in the Reichstag building, preceded by an address of welcome by Vice-President von Kardorff of the Reichstag. Lord Derby reviewed the progress made in the development of power since the first World Power Conference, which was held in London in 1924 and was followed by three sectional meetings—in Basle, Switzerland, in 1926; in Barcelona, Spain, in 1928, and in Tokyo, Japan, last year. Lord Derby made special mention of some of the papers contributed to the conference by leading scientists and men of noted achievements in the technical world. He concluded by handing the insignia of office to Dr. von Miller.

Dr. von Miller, in accepting it, alluded to his fifty years' experience in electrical and hydraulic work as a qualification in the appreciation of the background of the conference. He welcomed the opportunity of German engineers to show their foreign confreres Germany's advance in the establishment of scientific institutions, the development of power resources and distribution networks and the reconstruction of factories. A splendid opportunity, the president said, had arrived for engineers from all countries to become acquainted, exchange experience, form friendships and learn to appreciate one another.

Chairman Merrill in Berlin

Proceedings of first day

Formal opening of the conference took place at the State Opera House on Monday morning, flags of all nations surrounding the delegates, who numbered four thousand, half from Germany and half from other nations. Dr. von Miller's opening remarks were followed by an address from Dr. Bruening, German Chancellor, and a message from President von Hindenburg. Burgomaster Scholz then welcomed the visitors to Berlin, Sir Charles Parsons spoke for Great Britain, Georges Magnier for France, Ludwig Jollonezko for Poland, Professor Ossadtschy for Russia, Gustav Malm for Scandinavia, H. J. van der Bijl for South Africa, Charles Camsell for Canada, M. Kamo of Japan for Asia, Dr. Rirett for Australia and New Zealand, and Dr. Wilvia for South America.

Dr. Tissot of Switzerland then read in three languages the draft of a telegram sent to President Hindenburg on behalf of the conference, and Chairman Koettgen made the closing remarks. The keynote of all the speeches was a recognition of the opportunity that had come to the delegates to further not only the cause of better power economics but that of human progress and lasting peace.

In the afternoon Prof. Albert Einstein gave in conversational manner a talk on his relativity theories. This will be briefly abstracted in next week's issue. Chairman Merrill spoke for the United States in the evening at a reception given to the delegates by the German government at the Zoological Gardens.

Radio joins three nations

Wednesday's proceedings included greetings from President Hoover in a message read by Ambassador Sackett, who also made the address noted in another column. Mr. Hoover said:

"Imagination is stirred by the ever-widening field of knowledge and its practical application in multiplying instruments of service to mankind. Civilized society depends to an ever-increasing degree upon the spirit of inquiry and the utilization of scientific truth. Those who serve this cause serve best the interests of the race."

In the evening 4,000 persons assembled at the Sport Palace heard seven brief talks over a world-wide radio hook-up. Drs. von Miller and Koettgen spoke at Berlin, Lord Derby (who had returned to England) and Marconi at London, Edison at West Orange, N. J., and Matthew S. Sloan and Owen D. Young at San Francisco, the remarks alternating as between the hemispheres and nations.

Ambassador Sackett Talks Out on Distribution Costs

NEWSPAPER ditpatches from Berlin this week gave much prominence to an incident that arose at the World Power Conference in connection with the address of the American Ambassador to Germany, F. M. Sackett, former Senator from Kentucky and former president of a light and power utility in that state which was absorbed by the Byllesby interests. Mr. Sackett's address emphasized strongly the high cost of distributing electrical energy as compared with the reduced cost of generation.

Friction arose when Samuel Insull of Chicago criticised the assertion of Mr. Sackett, contained in the printed address, that the ratio of cost to consumers with cost at the busbar was fifteen to one. Fault was also found with the Ambassador's suggestion that the federal government should acquire a steam plant and experiment in an attempt to cut down distribution costs. This was held to be a quasi indorsement of the principle of government ownership and an undeserved reflection on the private systems of the United States.

Resenting what he construed as an attempt at censorship, the Ambassador released his address to the newspapers, asserting at first that he would not deliver it but would confine himself to reading President Hoover's message. He afterward receded from this attitude, and the address was made on Wednesday morning with no change in the original language. Some extracts from it follow:

> I know no other manufacturing industry where the sale price of the product to the great mass of consumers is fifteen times the actual cost of production. My purpose is sharply to define a weakness that calls for the keenest thought in your deliberations. Until the power business is brought in line with other industries in the relationship of its cost of production to the price paid by the consumer, there can be little justification for the thought that this great power industry is rapidly approching perfection.
>
> Whether electrical energy is produced from water power with its standby plants or by modern steam units, you have by constant improvement driven down thus far the cost of electricity until it can be fairly said an economical station produces current at from 0.3 to 0.4 cent per kilowatt-hour. In most great centers of population, in America at least, consumers pay for household service at around 6 cents per kilowatt-hour, fifteen to twenty times its cost. Such a discrepancy between the production cost and the delivery price gives a wide field for study by the distribution engineer.
>
> It gives little satisfaction to the great mass of household consumers to point to the high construction costs required to serve the small user, to urge the large reduction in the price that is made for quantity service through a single installation or even to call the roll of reductions in delivered prices that have followed through the years. The fact remains that there is an extraordinary margin between the cost and the sales price, to the reduction of which science may apply itself with greatest benefit to the people as a whole. . . .
>
> I have taken occasion to draw this parallel between cost and sale prices with a view to a situation which should claim the attention of the utility interests in America, where power development is almost exclusively in private hands. There exists in America a rapidly growing body of public opinion led by laymen of great ability which is demanding governmental competition in rates with private power enterprises. So drastic is the demand that it vocalizes with the thought that all water-power forces should be government owned and operated. This public clamor cites with enthusiasm the delivered cost of certain municipally owned systems in neighboring countries as proof of the iniquity of charges for electricity by our privately operated plants. . . .
>
> The parallel just drawn, showing a proportion of fifteen to one between the cost of the product and the sales price, would seem to indicate that the experiment of reducing costs by government operation can be fully tried by limiting it to the operation of any modern steam plant with its distribution system. The complete experiment need not involve the subversive principle that the government should own and operate the water-power sources of electricity.

Ambassador Sackett's speech brought from San Francisco this statement from Matthew S. Sloan, president of the National Electric Light Association, in convention there:

> "Ambassador Sackett is mistaken in his facts. Electricity does not cost the great mass of consumers fifteen times what it costs to produce, as he said. On the average, the country over, the sales price to domestic consumers is not over four times the cost of energy at the power house. The Ambassador discloses a lack of understanding of the fundamental economics of business generally and particularly of electric service."

Another repercussion from the Ambassador's address was a characteristic attack in the United States Senate by Norris of Nebraska upon the "power trust" and Samuel Insull.

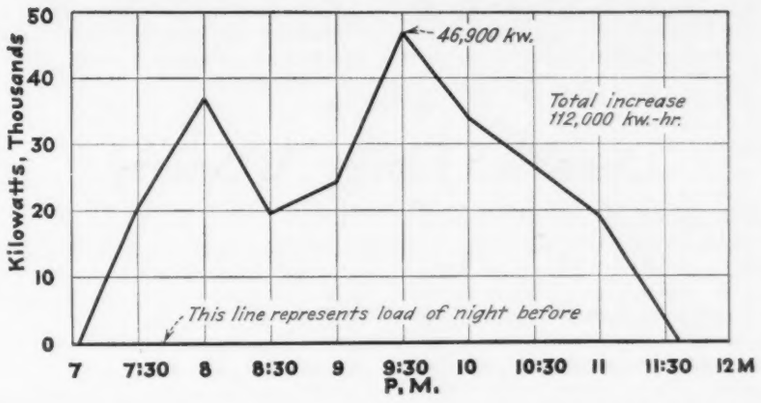
▼

State Line Generating Contracts Sustained

A RULING has just been handed down by the United States Circuit Court of Appeals in Chicago in favor of the State Line Generating Company and against Charles B. Shedd, who through injunction proceedings sought to block the carrying out of terms of the contracts between the generating company and public utility companies for the purchase and sale of electrical energy.

Mr. Shedd, who owns land in Hammond near the Indiana-Illinois state line, a strip of which 300 ft. in width was acquired by the Northern Indiana Public Service Company through condemnation proceedings for the construction of a transmission line, has been opposing the project in the courts for two years. His contention was that

RADIO RINGSIDE SEATS BOOST LOAD CURVE



INTEREST of owners of "all-electric" radio sets in professional fighting has a direct effect on central-station output. The Sharkey-Schmeling fight on June 12 caused the consumption of electrical energy in Greater New York to rise 46,900 kw. above that of the preceding night, as shown by the load curve of the New York Edison System, the increased use of electricity being 112,000 kw.-hr., which was greater than on the night of the Sharkey-Stribling fight in Miami in February, 1929, when the increase totaled 97,400 kw.-hr.

An unusual feature of the load curve last week is that it has two peaks, one at 8 p.m. and a higher one at exactly 9:30 p.m.

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the condemning company had no right to allow its lines to be used by other utilities to carry energy bought at a common generating plant. The court sustained the disputed right and held that it made no difference whether the companies so using the lines conveyed the energy to another state.

▼ ▼ ▼

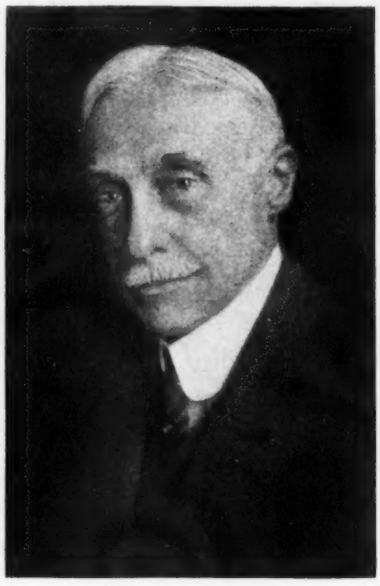
Death of Elmer A. Sperry

COMPLICATIONS that followed an operation, performed it was first thought successfully, led to the death of Elmer A. Sperry, famous inventor, engineer and manufacturer, at St. John's Hospital, Brooklyn, N. Y., on Monday morning, June 16. He was in his seventieth year. As a charter member of the American Institute of Electrical Engineers and the American Electrochemical Society and one whose inventions and activities, if not all strictly in the electrical field, all tied in closely with electrophysics, Mr. Sperry's death aroused widespread regret among electrical engineers generally as well as in technical and business associations of many kinds with which he was affiliated. At the time of his death he was chairman of the board of the Sperry Gyroscope Company, Brooklyn. Funeral services were held in Plymouth Church, in that borough, on Thursday and attended by many distinguished men.

Elmer Ambrose Sperry was born in Cortland, N. Y., on October 12, 1860, and educated at the State Normal School, afterward attending Cornell University, Ithaca, for a short period. A natural-born machinist and inventor, he designed in 1879, while yet a youth, a revolutionary device for the perfection of one of the first electric arc lamps. This device was generally adopted. In the following year he founded the Sperry Electric Company of Chicago to manufacture arc lamps, dynamos, motors and other electrical apparatus. This was the first of a long series of enterprises employing electricity promoted by him. They covered such diverse apparatus or fields as beacon lights of many descriptions, mining machinery, street-railway cars, automobiles, airplanes, commercial chemistry, detinning processes and the production of fuse wires. Previous to 1910 there were already six large industrial corporations founded to manufacture Mr. Sperry's inventions, doing in the aggregate an annual business of many millions of dollars. In addition to these, his contributions to modern progress may be seen in scores of other industries.

It is his gyroscope, however, to which Mr. Sperry owed the major portion of his popular fame, and with this device his name is inseparably connected. His first successful gyro compass, perfected in the opening decade of this century, became standard gunnery and navigational equipment in the navies of the world, and it is said that there has been no permanently successful development in this line other than Mr. Sperry's. In the Great War he was an active member of the Naval Consulting Board and chairman of two important committees thereof. His gyro compass has been adapted to airplanes, and he also invented an airplane stabilizer and a drift indicator.

His achievements in high-intensity arc searchlamps are almost equally well known. In one step, it is said, he produced a practical light with a brightness



Elmer A. Sperry

500 per cent greater than in any previous lamps—an advance which has been compared with Sir Humphry Davy's discovery of the electric arc itself.

It is impossible, however, to enumerate here all Mr. Sperry's inventions. He had more than four hundred patents to his credit. In the words of a recent biographer, writing in November, 1928: "Mr. Sperry has probably done more in the various fields of engineering than any man living today. He has worked for a period of more than forty years and has covered an unusually broad field in the arts and sciences. He has been essentially a pioneer, never caring for the conventional methods. He is a man of untiring energy—no hours are too long nor personal sacrifice too great to accomplish the results he set out to obtain. With all his varied activities and heavy responsibilities, he is always sympathetic and helpful to those associated with him."

Mr. Sperry belonged to many professional societies and had been the recipient of many honors, of which one of the most recent was the John Fritz medal. This was presented to him in New York on December 7, 1926, when his achievements were recited by Gano Dunn, past-president of the A.I.E.E.; William L. Saunders, chairman of the Naval Consulting Board, and Rear Admiral Bradley A. Fiske, retired, the two last named dwelling on what the inventor had done for navigation and the navy. In 1929 Mr. Sperry served as president of the American Society of Mechanical Engineers. The first World Engineering Congress, held at Tokyo last year from October 31 to November 7, owed its initiation and much of its success to Mr. Sperry, who accepted the chairmanship of the American committee and headed the American delegation. This was his last outstanding achievement in the promotion of engineering progress.

Two sons and a daughter survive Mr. Sperry. His wife died recently in Cuba while on a trip to that island with her husband.

Tributes from associates

News of the inventor's death brought forth tributes from many friends and associates. Some of these are appended:

Secretary of the Navy Adams:

The United States naval service ashore and afloat will learn with deep regret of the loss of one from whom we have received much. As a member of the Naval Consulting Board since 1915, Mr. Sperry rendered invaluable service. It is safe to say that no other American has contributed so much to our naval technical progress as did he.

Thomas A. Edison:

I had a very high regard for Mr. Sperry, who was a man of great energy and industry. He was a prolific inventor, of great resourcefulness and capacity. His death will be a great loss to the country.

Harold B. Smith, president A.I.E.E.:

Elmer Ambrose Sperry has laid down the burdens of an active and most useful life in which he took keen interest in all that could benefit the race through his chosen field of engineering. He early evinced abilities inherited through the long line from Richard Sperry of the New Haven Colony of 1660. With a thorough training and wide experience, a frequent contributor to professional literature, responsible for many inventions, he spent his years as an organizer of industry and an inventor of note. The recognition of his work has been worldwide. He lived his life as a useful servant of man, active in the solution of human problems and of extraordinary initiative.

Gano Dunn, past-president A.I.E.E.:

We have lost a clean and sweet personality endowed with creative ability that has left its monuments in the

early electrical, automotive and chemical fields, and in aeronautics and navigation. We owe to him the most intense electric arc, and, besides electrochemical processes that have established industries, he contributed much to the early electric railway, the automobile and to electric power in mining. Among his best-known works are the transformation of the gyroscope from a scientific toy into a stabilizer for ships and airplanes and into an uncanny device which, supplanting the age-old mariner's compass, points true north without deviation and automatically takes charge of the helms of our leviathans with a resulting course more accurate than human hands can steer. His life was rich in friends and rich in contributions to the organization and dignity of the engineering profession, as well as prolific in the application of science to the useful arts.

Frank B. Jewett, past-president A.I.E.E.:

In the death of Elmer Ambrose Sperry the engineering profession has lost much more than a distinguished member. It has lost one of its outstanding leaders—one of that small group of men who have done so much to elevate engineering in America to its high position. Nor are the engineering profession and we who were fortunate enough to know him best the only losers. The United States has been deprived of a great citizen. Few men are privileged to combine in themselves so much of genius, kindliness, high idealism and youthful enthusiasm in all things and of the spirit of true Christian living.

M. I. Pupin, past-president A.I.E.E.:

The engineering world has suffered an irreparable loss in the death of Dr. Elmer A. Sperry. His devotion to the highest ideals in engineering and his burning enthusiasm in all endeavors to reach these ideals were always an inspiration to American engineers.

Elihu Thomson, General Electric Co.:

The work of Elmer A. Sperry, my dear friend for nearly fifty years, was that of a pioneer of exceptional originality and versatility. He was an able contributor of original work to the records of our societies, many of which claimed him as the foremost member.

▼

Susquehanna Power Stock Assessment Is Upheld

ASSESSMENT of $6,000,000 on the capital stock of the Susquehanna Power Company, which is linked in the power-producing enterprise at Conowingo, was upheld unanimously last week in the Maryland Court of Appeals, which in so doing sustained the State Tax Commission.

The court held that the validity of the assessment was not affected by the fact that the stock is held by the Philadelphia Electric Company, a non-resident corporation.

Couzens Bill Passes—Shoals Measures Rest—Foshay Finance Examined

PASSAGE of the Couzens bill reorganizing the Federal Power Commission is looked upon in some quarters as laying the foundation for federal regulation of power. As this is written, the signature of the President has not been attached to the measure. The House conferees yielded to Senate insistence that the bill provide for the retention of the office of solicitor. The Senate conferees accepted the House provision for five commissioners.

Muscle Shoals is still in deadlock, with the possibilities of settlement, which have been thought remote all along, now virtually hopeless during this session of Congress. Making a last stand for a settlement, Senator Black of Alabama on Monday last urged action before adjournment on the grounds of economic losses due to plant idleness.

Probing into the affairs of the W. B. Foshay Company of Minneapolis during the past week, the Federal Trade Commission has not been dealing with a prosperous and well-managed group, as in past hearings, but with one now in receivership. Several significant facts as to the causes of failure were brought out by the commission examiners. It was shown that dividends, large salaries and bonuses were paid out of capital. The firm made a practice of selling properties, with a write-up of, say, 20 per cent, to its own subsidiaries, such as the Public Utilities Consolidated Corporation. In some cases it would take stock from the subsidiary as payment before the property involved in the transaction was acquired. The stock would be sold to finance the purchase, but the market would not take all of it at the end. Dividends were paid to the verge of bankruptcy. A favorable balance was shown on the books on the basis of some of the incomplete stock transactions, though an actual deficit existed. These are some of the high lights of the enterprise. The evidence was submitted entirely by commission examiners, no company representatives coming to Washington.

Organized in 1917, the W. B. Foshay Company, incorporated in Delaware and Minnesota, gained control of more than twenty electric and gas properties held under the Public Utilities Consolidated Corporation, which is incorporated in Delaware and Arizona. The operating subsidiaries are mostly small and scattered. The service is said to extend to 244 communities with a population of 331,000. Electrical generating capacity is given as 25,697 kva. and daily gas capacity as 1,635,000 cu.ft. Water, telephone and ice properties are included in the system. The 1928 revenue is given as $1,658,022 and the 1929 as $2,696,456, gross, of which electricity made up just half. A subsidiary erected the Foshay Tower Building in Minneapolis at a cost of $4,400,000.

Stock sales were pushed by large and active use of advertising. An extensive publicity mailing list also was maintained through 34 states. This, the testimony showed, brought large returns in "free advertising" placement. Mr. Foshay became impressed with the value of country newspapers in molding public opinion in consumer territories and was said to have purchased options.

▼

Coming Meetings

World Power Conference—Berlin, Germany, June 16-25. O. C. Merrill, Edmonds Building, Washington, D. C.

American Electric Railway Association—San Francisco, June 21-26. Guy C. Hecker, 292 Madison Ave., New York.

American Institute of Electrical Engineers—Summer convention, Toronto, June 23-27; Pacific Coast convention, Portland, Ore., Sept. 2-5. F. L. Hutchinson, 33 West 39th St., New York.

American Society for Testing Materials—Haddon Hall, Atlantic City, N. J., June 23-27. C. L. Warwick, 1315 Spruce St., Philadelphia.

Wisconsin Utilities Association—Electric Section, Lorain Hotel, Madison, July 17 and 18. Commercial Section, Green Bay, July 31 and Aug. 1. J. N. Cadby, 105 Wells St., Milwaukee.

Camp Co-operation X—Association Island, Henderson Harbor, N. Y. July 31-Aug. 4. Society for Electrical Development, 420 Lexington Ave., New York.

Association of Electragists International—Hotel Schroeder, Milwaukee, Aug. 18-20. L. W. Davis, 420 Lexington Ave., New York.

International Association of Electrical Inspectors—Northwest Section, Bellingham, Wash., Aug. 25-27. F. D. Weber, 414 Lumbermen's Bldg., Portland, Ore. Western Section, Congress Hotel, Chicago, Ill., Sept. 15-18. W. S. Boyd, 175 Jackson Blvd., Chicago, Ill.

Pennsylvania Electric Association—Bedford Springs, Pa., Sept. 3-5. Harold A. Buch, Telegraph Bldg., Harrisburg, Pa.

American Railway Association—Hot Springs, Ark., Sept. 9-11. H. S. Balliet, 30 Vesey St., New York.

Empire State Gas & Electric Association—Annual meeting, Saranac Inn, N. Y., Sept. 18 and 19. C. H. B. Chapin, Grand Central Terminal, New York.

Eastern Association of Electrical Inspectors—Annual meeting, Pittsfield, Mass., Sept. 22-24. R. Walker, 85 John Street, New York.

Great Lakes Division, N.E.L.A.—Annual convention, French Lick Springs, Ind., Sept. 25-27. T. C. Polk, 20 North Wacker Drive, Chicago, Ill.

New England Division, N.E.L.A.—Annual convention, New Ocean House, Swampscott, Mass., Sept. 29-Oct. 1. Miss O. A. Bursiel, 20 Providence Street, Boston, Mass.

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W. A. Jones

Vice-President Henry L. Doherty & Company

The Next President of N.E.L.A.

EDITORIALS

L.W.W.MORROW
Editor

Regulation, Investment, Load Building

AGAIN a notable convention of the National Electric Light Assocation has passed into history. This year's gathering was notable for its utterances, notable for the environment of events which made other utterances remain unexpressed, and notable for a solemn recognition of new problems facing the industry. A significant factor influencing the atmosphere of these meetings was concentrated attention to new problems. Two, especially, of these were discussed in masterly fashion.

Messrs. Kehoe, Bailey, Insull and others discussed the ominous trend of the unit investment costs of power delivery per dollar of revenue. Reductions in production costs are being obliterated by increases in distribution costs. No spectacular solution for this impediment was presented, and possibly none can be, but emphasis put upon it may safely be relied upon to inspire the engineer to effect savings at detailed points and pioneer in departures from the established order.

THE commercial group felt its great problem to be one of increased sales manpower and organization. Sizable loads await conversion to the electric way, but there is no denying that they are largely marginal loads and involve a heavy element of competition—competition with gas, oil, waste fuel—competition for the consumer's budget dollar. The loads which spontaneously fall into the lap of the electric company have largely fallen already; the rest will be obtained by selection and intelligent reaching. New ideas will have to be employed to invigorate and accelerate the sales approach to all prospective loads. It will not be at all surprising if many utilities are eventually converted to a sales philosophy more in keeping with that of competitive enterprises frankly out for profit. Appeal to the selfish interest of the customer, expression of values in terms of his needs and desires, less emphasis on the good intentions and past accomplishments of the sellers —these seem to be the ingredients which will make the new dish palatable and nutritious.

IT HAS appeared hopeless to convince the public that the array of distribution costs is inevitably far in excess of the production costs of energy; that the intricacies of rate schedules have sound foundation in economics, or that current state regulation is nearly as good as can be hoped for under existing constitutional and legislative complexities. Nothing more promising could be inferred from the subjects so thoroughly discussed than that the industry is about to embark on new seas of exploration. Could the customer's selfish interest in electric service be skillfully cultivated, much of his bewildered contemplation of the alleged shortcomings of regulation, of the asserted need for more of it, of unintelligible rates and differentials would subside. Calm, unimpassioned opportunity then would be afforded to surmount in orderly internal adjustment the technical, economic and legal obstacles to untrammeled, unselfish public service, with compensatory returns assured to the investor.

Berlin Echoes San Francisco on Distribution Cost Ratio

AMBASSADOR SACKETT, president of an electric utility until it was added to the Byllesby chain, was well qualified to address the World Power Conference in Berlin on the factors that give heart to the proponents of government ownership. His intimate knowledge of the technology and economics of electric service prompted him to contribute to the deliberations a solemn emphasis on the prime handicap of the electrical industry—distribution costs. It is no secret that few other industries reflect so large a ratio of delivered cost to initial production cost. And when the whole business world is scrutinizing operation with the hope of causing the gap between producer and consumer to shrink, the electrical industry can hardly put forth its obstinate technical deterrents as ground for complete exemption from the scrutiny. In fact, the outstanding engineering paper at the simultaneous sessions of the National Electric Light Association in San Francisco, one by A. H. Kehoe, emphasized in other words the same concern about submergence of production economies by the rising tide of distribution investment costs.

The Ambassador magnanimously supplemented his declaration that "consumers pay for household service around six cents per kilowatt-hour, fifteen to twenty times its cost of production," with a recognition of the limitations imposed by the present technique of electric circuit construction. He no more than expressed the conviction of the industry itself when he added that its "leaders should strive with renewed efforts to conquer this ratio of fifteen to one which finds no counterpart in any other important industry." Another ratio, sixteen to one, became famous from much more humble beginnings.

When objections were interposed to the political content and tone of the speech, probably no one expected that the Ambassador would at first decline to deliver the address, though releasing it to the press. The subsequent publicity was far greater than if the address had merely been delivered in the ordinary course of events.

The industry has on other occasions suffered from the zeal of its friends, also from the activities of politicians. Never, however, has greater prominence been given to the one stubborn impediment to equality of industrial and residential rates. A strange irony of fate that the very feature of extended distribution systems promoting universal availability which gave electricity its chance to supersede all other forms of power transmission should now figure so pointedly in international press dispatches as the foundation of one of the industry's stringent public relations problems.

The True Measure of Sales Proficiency

IF ONE thought were to be singled out of the commercial program of the San Francisco convention as a keynote, it could best be taken from the very admirable address of Martin J. Insull, in which he discussed the load-building opportunities ahead of the industry. The kernel of it was the argument that the proficiency of a sales manager in the electric power industry may be measured by the load factor of the business that he is taking on to his lines. Or, to put it in the more familiar parlance of the world of electricity, load-factor correction through the selective development of those applications of the service that broaden the peak is becoming so important to the economic health of the industry that it can no longer be neglected.

There is nothing revolutionary in this statement. It cites a fact that has been well known for many years and is beyond dispute. To one unfamiliar with the history of the central station it would be apt to sound like a prosy truism. But in a National Electric Light Association convention, from an acknowledged leader of executive thinking, it comes as a warning and a declaration of an awakening commercial consciousness.

Power company men have long talked of filling up the valley of the load curve. Engineers have presented the possibilities offered by this class of business and the others. Sales managers have agreed to the desirability of a more intelligently planned development of market. But in the end the good intentions have been overcome by the urgent necessities of the day's work, the insistent demands of an ever-growing popular demand and

the complacency that is well-nigh inescapable where the absence of the sharp barb of competition and the comfortable habit of prosperity have been too long enjoyed. And so this very practical objective has not yet become established as a standard practice. It is still an ideal and an objective. But this week the indorsement of authority has raised it as a rallying cry.

Anomalies in Regulatory Practice

IN THEORY the prime function of regulation is the assurance of reasonable rates for more than reasonably good service. The courts have said that a reasonable rate is one that makes the efficient enterprise moderately profitable. Thus the criterion in rate regulation has swung toward regulation of profits—but profits on what? Here the whole dubiousness of the theory makes practice an uncertain venture. Lacking, however, any other firm foundation, the commissions have been forced to pin their wavering faith on compromises based on the disputable principles and flavored by current economic exigencies. Commissions are committed primarily to a joint cost-of-service and magnitude-of-profit theory.

The strange and significant circumstance is that neither of the other two parties, utility and public, give first thought to this composite concept. Virtually every rate expert admits privately that absolute costs are difficult of precise determination under shifting conditions of load density, power factor and load factor. In fact, such factors are subordinated to the superior consideration of value of service to the user. The user likewise is prone to make his electrical expenditures, at least for the marginal uses which he now is being importuned to undertake, primarily on a budget and value-of-service plane. Whether his spare dollar goes for a water heater or a radio, for a range or for a new set of tires, is determined largely on a subconscious weighing of values. The company's net profit on the transaction hardly disturbs his thought.

The anomaly in the whole situation lies in the fact that rates are calculated by the companies and paid by the user on a value-of-service basis, while the commissions endeavor to analyze them on a cost-of-service-plus basis. The very fact that electric rates are so generally satisfactory to the public seems to confirm the superiority of the value-of-service notion as automatically giving both parties what they most desire. Maybe the whole regulatory function would recover its full prestige if it could be accommodated to the actualities, even if theories have to be abandoned. The objection will be raised that values of service are intangible and not susceptible of precise determination. Does any one claim that allocated costs and rate bases are any more capable of precise determination satisfactory to all interests? The public might have at least as much confidence in comparative rates founded on economic statistics of cost of living and the psychology of its own expenditures as it has had in the present regulatory concepts.

Elmer Ambrose Sperry

INVENTOR, engineer, gentleman and citizen extraordinary, Elmer Ambrose Sperry has completed his active contributions to humanity and the mechanized world. His work covered many fields, including outstanding scientific developments in naval, aërial, navigational, transportation, lighting, electrochemical and other realms of practical physics. The principles which he developed so successfully will for years to come prove fundamental in the respective arts to which he applied them.

Recipient of numerous honors from scientific and engineering bodies, from emperor, czar and republic, Dr. Sperry was best known to the world at large for his development of the gyroscope. His intense activity is shown by the fact that at the time of his death he had taken out nearly four hundred patents. He was a working member of many societies and was largely instrumental in the successful completion of plans for the first World Engineering Congress, held in Japan last year. The world, always poorer for the loss of those truly broad souls whose interests and intelligent enthusiasms know few limitations, may well bid a thoughtful farewell to one who contributed so generously from his talents and resources.

N.E.L.A. Meets in S

The Civic Auditorium

REGULATION, holding companies, commercial development, public relations and the trend toward higher system costs occupied attention at virtually every session of the National Electric Light Association convention in San Francisco this week. The topics were not confined to the general sessions. They permeated the engineering, accounting, public relations and commercial gatherings.

Various speakers cited case after case indicating that state regulation has been effective and that federal regulation would remove control from the persons most intimately acquainted with conditions. Specific examples were cited showing that without consolidations the public could never enjoy the type of service it now receives at existing rates; but what aroused most interest were some of the revelations made regarding the activities of some of the individuals and organizations actively engaged in carrying on an agitation concerning utility regulation and holding companies.

Necessity of intensified commercial development remains at the forefront as a major problem. Opportunities were cited by several executives, and chairmen of the various commercial committees told about the activities that have been found most successful in attaining better results. The Engineering Section presented an excellent series of addresses dealing with major economic problems.

Whether the convention be considered from the viewpoint of attendance or program, it was essentially an executives' convention. Executives represented a larger proportion of the total attendance than heretofore. To every topic discussed an executive slant was given.

First General Session

Public understanding essential

The necessity for adequate public understanding of the electric utility industry was the outstanding theme of the opening session, either by direct statement or by no less emphatic implication. "What is needed now and for the future," said M. S. Sloan in his presidential address, "is not heat nor hate nor demagogy, but the application of economic principles through laws protecting the public and the utilities." This statement was made as a reply to the condition in which "public utility laws are being recast amid a clamor of extremist theories, demagogic attacks and political maneuverings." The need of the industry implied by Mr. Sloan's address was for a fair presentation of the utility case to the public in order that it might not be used as political capital in the national and state elections of the next two years.

"Next to doing the right thing the most important thing in the world is to let people know that you are

San Francisco for Fifty-third Convention

doing the right thing." These words of the elder Rockefeller were used by Harry Reid as the text of his speech as chairman of the Public Relations National Section. Mr. Reid made a strong plea for more and better publicity on the known facts concerning the light and power industry. Merle Thorpe, editor of the *Nation's Business,* enumerated ten popular fallacies in regard to the electric utility industry that are assiduously referred to as facts by politicians and others whose interests are served by such misstatements. He pointed out that criticism of the central stations does not come from the actual users of electric service but only from their self-appointed protectors.

> **"In my humble judgment it will be a sad day for America when the government uses its great powers and unlimited resources to compete in business with its own citizens. It takes the citizen's money through the process of taxation and uses it to destroy his own business by going into competition with him."**

In these unequivocal words, Fred W. Sargent, president of the Northwestern Railroad, expressed his opinion of government ownership of utilities. "Those charged with the management of public utilities will be rendering a permanent and basic public service if they can make the widest possible distribution of their securities among the greatest number of our people," continued Mr. Sargent. "Such policy will create in the public mind a sense of ownership and responsibility that will inspire and maintain a demand for at least a square deal from politicians in dealing with property largely owned by the electorate."

Second General Session

Co-ordinated activities necessary

Discussing the problems of market building, Marshall E. Sampsell, chairman Commercial National Section, said: "A high standard of service requires more than availability of electrical energy. It requires rates that are economical to both the consumer and the company, adequate and reasonably priced wiring, and consuming utilization equipment readily obtainable at satisfactory prices. To create greater public appreciation of the comforts that complete electrical service provides we must adopt more intensive selling of domestic electrical appliances supplemented by well-organized national effort."

Warning his audience that America had better "stop, look and listen," Edward N. Hurley, former chairman of the United States Shipping Board, said that instead of Americans flattering themselves that they are in a position now to indulge in all kinds of luxurious experiments, they had better be stripping for action. "Were it not that some of our foreign competitors for international trade have previously handicapped themselves by socialistic ex-

periments which we are now urged to adopt, our position already would be much worse than it is," he said.

After reviewing in detail the progress which has been made in generating equipment, utilization equipment and rate trends, W. A. Jones said that the diligence with which the light and power companies have developed business in recent years has been commendable, but, viewed as a whole, the industry has not excelled in commercial development.

"I cannot resist recommending that the manufacturer and the public utility reverse their position," said A. W. Robertson, chairman of the board of Westinghouse Electric & Manufacturing Company. "Instead of directing all of their attention toward each other, they should place their backs together and devote their attention to the problems outside of themselves."

Through the utilization of the greatest international radio-telephone, telegraph and cable hook-up ever attempted those who attended the second general session on Tuesday morning heard an exchange of greetings and felicitations between Matthew S. Sloan in San Francisco and Dr. Carl Koettgen, chairman of the second World Power Conference in Berlin. Likewise Owen D. Young and Dr. Oskar von Miller were heard from the same respective points, while from West Orange came the voice of Thomas A. Edison and from London the words of Lord Derby and of Senatore Guglielmo Marconi. Those attending the Berlin conference as well as listeners in Japan, Australia, Europe and America also heard the notable messages.

Third General Session

Regulation stabilizes power industry

Brushing aside the fog of political misunderstanding and misinterpretation which has impeded the clear course of the industry toward still greater public service at various times in the past few years, leading utility executives contributed powerful support to the cause of regulation at the third general session on Thursday. Martin J. Insull, president Middle West Utilities Company; William J. Hagenah, vice-president Byllesby Engineering & Management Corporation, and William A. Prendergast, former chairman of the New York Public Service Commission, declared that regulation has attained a high degree of success in American public utility operation and that the insurance of good service at fair rates by the state commissions is the basis of constant progress toward the goal of prosperity for both companies and customers.

"Regulation of the operating company with freedom of the holding company is to the best interest of the public," asserted Mr. Insull. "The public is thus protected against monopoly and has the advantage of the initiative and enterprise that financially strong private business brings to institutions where its money is invested," continued the speaker. "Had the holding companies not found the necessary financial resources to carry on, the history of the industrial rise of the United States might have been written very differently. By eliminating the amount of securities of the operating company in the treasury of the holding company, it will be found in most cases that the aggregate amount of securities of both corporations in the hands of the public is probably less than the total securities issued by the operating company alone."

"Industry expansion, centralized management and great public benefits have resulted from state regulation," declared Mr. Hagenah. "Every contract between a management organization and its operating subsidiaries is subject to the closest scrutiny by the state. No wrong can come to any customer from utility service supplied under the direction of a central organization so long as the character of the service in each community and the rates to be charged are prescribed by competent state authorities and the issue of securities is subject to public inquiry and approval."

A vigorous defence of state regulation and a demand for fair allocation of service costs among various classes of users was voiced by Mr. Prendergast. " 'Stock watering' was cured by regulation and the effect on security values was quickly perceived by bankers and the public. To the extent that inadequate support of state commissions has restricted their operations, legislatures and gov-

J. E. Davidson, Paul Clapp, Mr. and Mrs. M. S. Sloan and Miss Sloan

ernors are responsible," the speaker said. "Despite all the manufactured crises and collapses produced by pseudo-economists, the utility industry is maintaining its primacy against all the unfavorable conditions incident to a marked decline in the volume of general business." The speaker presented telling evidence that public ownership is weakening.

Edwin Gruhl, vice-president and general manager North American Company, presented striking figures

Mr. and Mrs. W. A. Jones

showing that the electric dollar in the home now has a buying power of $1.36 against $0.58 for the "general-cost-of-living" dollar compared with 1914 and revealing numerous instances of the decreasing cost of electric service in comparison with other items in the modern budget.

Fourth General Session

Rampant socialism assails utilities

In a scathing attack made at the fourth general session on Friday morning upon anti-utility organizations and socialistic elements in the population seeking to undermine the private business of the country through government ownership propaganda, Bernard F. Weadock, special counsel for the utilities in the Federal Trade Commission investigation at Washington, appealed to men in the industry to meet these insidious assaults with courage and truth. The speaker declared that an unholy alliance now exists between various organizations dominated by the national Socialist party, all of which, he maintained, are working in common to establish an American soviet in control of business. In a long series of specific charges Mr. Weadock exposed the sinister purposes and half-concealed methods of this group, estimated at about 4,000 persons. He declared that energy and resolution are needed to save democracy from the enemies within its gates.

M. S. Winder, executive secretary of the American Farm Bureau Federation, speaking for its two million members, said emphatically that the interests of American farmers can best be served by private ownership of utilities. The speaker asserted that the recent generous use of power-driven machinery has made the American farmer by far the most efficient producer of agricultural commodities that the world has ever known. He predicted that electricity will be a still more important factor henceforth in preserving the American farm home.

A. D. Bailey, chairman of the National Engineering Section, touched upon the increasing importance of economic problems in light and power engineering development and voiced the advantages of interchanging information through co-operative work.

Paul M. Downing, vice-president and general manager Pacific Gas & Electric Company, gave an interesting talk on the present and future of electrical development in the Far West.

Commercial Section

Develop the home market

Interest in the Commercial Section session on Wednesday afternoon centered around the electrification of the home, the highlights being an address by Martin J. Insull, president of the Middle West Utilities Company, and a pageant presenting the "Spirit of the Electrified Home." It developed well the keynote struck by President Sloan in his opening address when he said that "The electrical industry has gone commercial."

Mr. Insull pointed out the growing importance of the selective development of load, since further expansion of electric service must necessarily come in the less densely settled and more agricultural regions of the country and in the smaller towns, and it is therefore costing more to bring electricity to the consumer. "We must not merely sell quantities of kilowatt-hours," it was his contention. "We must sell those kilowatt-hours that will be used at the right time. We must keep our investment working as near 24 hours per day as possible." The capital expense of distribution tends to more than offset the savings in the cost of power-generating facilities which have been brought about through the benefits of interconnection, by larger plants, and by improved engineering technique. "The consuming habits of our patrons, and principally those patrons who compose the huge domestic market, really control the cost of providing service," Mr. Insull maintained. "It is the customer who determines whether we can furnish him services at 15 or 5 cents per kilowatt-hour."

Chairman Marshall Sampsell in surveying the year's work stressed the same opportunity for the improvement of load factor by building up the use and enjoyment of the service by the customer through the installation of more complete equipment. Mr. Sloan in congratulating the Commercial Section on its year's work said: "The industry is at last awake to the necessity for selling electric service—not just letting it sell itself. There is no earthly reason why we cannot sell current in every phase of its use if we set out to do it and our industry has entered the state of its development where it is necessary for us to do it."

As a climax to the session came the pageant in which a group of ten attractive young women representing modern light, electrical washday, cleaning, table cookery,

radio, water heating, ironing, the range, refrigeration and the smaller electrical comforts, built up a pyramid of load, each one indicating the percentage of present load her appliance provides and the possibility for increased load by its more general use. Earl Whitehorne of ELECTRICAL WORLD, in introducing the pageant, announced that a special committee of the Commercial Section, under Chairman Charles Harold of Brooklyn, will submit to the incoming administration a plan for the development of complete electrification of new homes as they are built, through co-operation with the speculative builder, real estate agent, investment banker and building and loan associations. Mr. Whitehorne characterized the growing public interest in electric labor-saving and comfort-giving equipment for the home as part of another great mass struggle for liberty. Through the evolution of civilization men and women have fought their way out of personal, political, religious and economic bondage and now are striving for a new freedom from domestic drudgery. Electrical men must play a large part in this emancipation and must plan on a broad scale.

Progress reports on the work of the three bureaus of the Commercial Section were submitted by the three bureau chairmen—M. E. Skinner for lighting, V. M. F. Tallman for commercial and industrial power and heating and F. D. Pembleton for merchandising. V. H. Moon, merchandise manager for the Pacific Power & Light Company, presented an address on "Planning Your Merchandising Program for the Year." According to charts exhibited by Mr. Moon the average annual kilowatt-hour sales to residential customers in the territory served by his company have increased from 322 in 1920 to 997 in 1929 by long time planning for selective load development.

Public Policy Session

Policy and international communication draw big attendance

As usual, the public policy session, Thursday night, was one of the best attended, executives and their wives being conspicuous. The entire program was broadcast through the courtesy of the National Broadcasting Company. It opened with selections played by the N.B.C. Concert Orchestra. Of spectacular as well as scientific interest was the international communications demonstration staged by Clinton B. Allsopp, vice-president Postal Telegraph Company, aided by A. H. Griswold, executive vice-president Postal Telegraph-Cable Company, who discussed the social and commercial benefits of co-ordinated communication and the technique and organization necessary to conduct it efficiently. The speed with which a telegraph message was sent around the world from one convention delegate to another and the ship-to-shore communications made the world seem small indeed to those assembled.

It was at this session that the recipient of the Coffin prize award was announced, and the prize was presented by President Sloan to Thomas N. McCarter, president Public Service Electric & Gas Company, Newark, N. J., for his company's outstanding accomplishments in commercial and engineering development and efforts to earn the good will of the public.

The public policy report, presented by Crairman Preston S. Arkwright, maintained that, although the size of the industry has created public suspicion, none the less consolidations and interconnections are essential to economical operation of the business. Special emphasis was put on the trend toward federal regulation and the conflict in dual regulation. If anything is done to disturb public confidence, electrical development will be curtailed and any undermining of the credit structure will handicap the whole nation, Mr. Arkwright pointed out in the report.

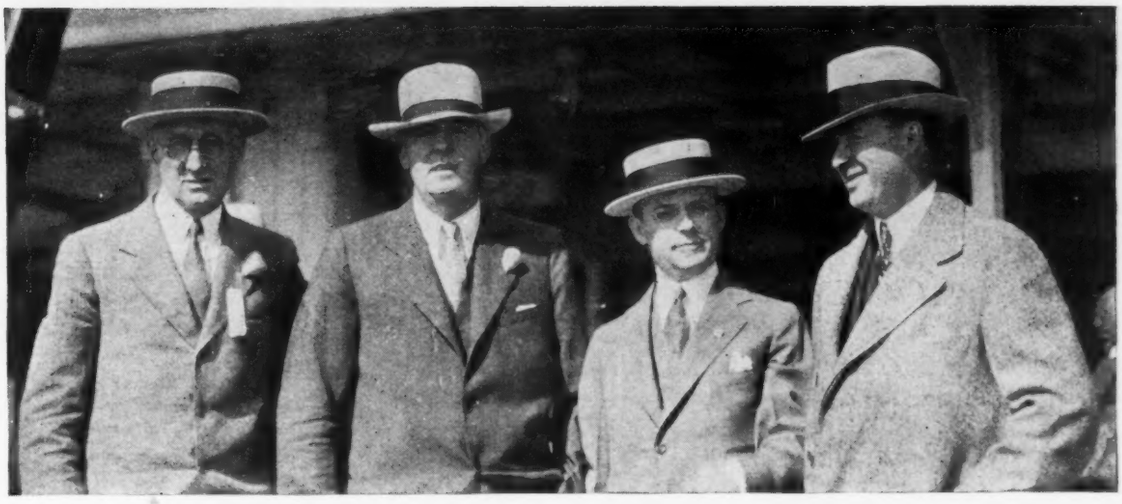
Public Relations Session

No time for vacillation

High spots of the radical and socialistic attacks upon the light and power industry were pointed to by Harry Reid, chairman Public Relations Section, who said that principles, investments, justice, fair play, individual initiative and even the future of private business are at stake. He declared: "Our hands are forced, and we have no choice. This is no time for vacillation. It is no time for making concessions to the radicals. What our industry calls for today is courageous, intelligent, persistent, widespread action."

Stating frankly that the electrical industry had lost

H. W. Beyers, F. W. Sargent, H. H. Barnes, J. E. Zimmermann and P. H. Gadsden



P. S. Young, Louis Edgar, P. S. Clapp and W. A. Jones

some public esteem, J. F. Owens urged that the charges of its critics be answered with facts. "There is more at stake," he said, "than merely the question of whether this business of ours shall continue to lead the van of American business enterprise. The question is whether the principle of individual initiative and enterprise as contrasted with political management shall continue to make American business enterprise the envy of the world."

Engineering Session

Trend toward steam development and higher system costs

In opening the engineering session on Tuesday afternoon, A. D. Bailey, chairman, reviewed the work of the past year and praised the work of the various committees. The trend from hydro toward steam power for new and future additional capacity in California was dwelt upon in the papers by A. H. Markwart and F. B. Lewis. This tendency they attributed to the fact that the remaining hydro sites are less accessible and more costly to develop, and also to the subnormal rainfall in recent years, whereas the thermal efficiency of steam plants has greatly increased and there are abundant supplies of cheap oil and gas. Thermal efficiencies of 26 per cent are now attainable and 28 per cent is expected with new high-pressure plants. The natural gas wasted last year in California was sufficient to meet the state's power needs twenty years hence. Moreover, high efficiencies cause steam plants to be less affected by possible fluctuations in fuel prices.

Mr. Markwart suggested the possibility of some future hydro power to supplement steam where the combined cost of mingled energy does not exceed the cost of steam alone. Mr. Lewis cited two factors as militating against hydro development, namely, riparian rights on streams, which often introduce uncertain elements of cost, and the public or political misconception that hydro power means cheap power.

A. H. Kehoe addressed the session on "Our Engineering Trends in Costs." He said that despite a reduction in generating-plant cost of 12 per cent from 1922 to 1929, there has been an increase in total system cost of 20 per cent per kilowatt of installed capacity. This is partly offset by some decrease in system investment per kilowatt-hour sold due to improvement in the use of installed capacity. He saw an opportunity for relief from these increasing system costs in greater simplification and standardization, asserting that "if low cost designs are based on a simple but rugged type of construction, there need be no sacrifice of efficiency, and many improvements are possible by such means."

President Sloan in a brief address of greeting to the Engineering Section expressed his conviction that, more than ever, the engineer has the future of the industry in his keeping. Inasmuch as the cream of the business has already been skimmed, there must be still greater co-ordination of production and sales effort to make possible greater loads at lower costs and lower rates.

Accounting Session

Executives and economists address accountants

Except for a résumé of the year's activities by Chairman W. R. Emerson, the accounting session was devoted to addresses by executives and an economist. M. A. Morrison, vice-president Byllesby Engineering & Management Corporation, urged accountants to clothe their facts in terms that the public can understand. He gave major attention, however, to the need for a broader realization of the holding companies' efforts to serve. Franklin T. Griffith, president Pacific Northwest Public Service Company, discussed the relationship of accountants to management. Owing to the consolidation of companies executives are becoming more and more dependent on written reports, he said. In preparing them accountants were urged to ascertain the purpose for which their figures are used and to compile them in such form that they may be most readily assimilated. The handling of depreciation and the establishment of standards of accomplishments were suggested as two very important problems in which accountants may be of considerable assistance.

Professor Ira B. Cross outlined the newer ideals that are being applied in business.

Offsetting Reduced Capital and Securing

OUR association has been privileged to participate in the unified effort of business called into being by President Hoover to overcome the effects of last fall's stock market crash. We were able to assure the President that there would be this year an expenditure of $865,000,000 for extension of our service facilities, in addition to the hundreds of millions regularly expended in operating our properties. Additional information regarding further new projects has brought this sum up to $1,046,000,000. One billion dollars to buy equipment and material and pay wages to workers all over the land, making business for others and sustaining the purchasing power of the customers of every variety of trade.

Energy output is reflecting the present conditions in general business. For the twelve months ended April 1, 1930, the electric companies generated 92,000,000,000 kw.-hr., an increase of 9 per cent over the previous year. Their gross revenue from sales was $1,980,000,000, an increase of nearly 8 per cent. In this period there was a severe curtailment of sales of industrial power, but revenue losses were made up by increases in street lighting, commercial lighting and domestic service. The total sales for domestic service during those twelve months were 10,100,000,000 kw.-hr., an increase of 16 per cent, and the revenues amounted to $614,000,000, an increase of 10 per cent. The average use of energy in the home increased 48 kw.-hr. that year, or 10.3 per cent. On the other hand, the average price of a kilowatt-hour declined 5.4 per cent. Thus, for that twelve months the average of bills was only $31.30, compared with $30 the previous year, or an increase of only 4⅓ per cent.

We must take into consideration with these facts one further fact. During the twelve months ended April 1, 1930, the number of new domestic customers was only 775,000, one of the smallest increases in customers added to our lines since the pre-war days. That figure compares with 1,340,000 during the calendar year of 1927. This falling off undoubtedly reflects a known decline in residence-building construction. It may also reflect a condition of temporarily closed factories and unoccupied homes. It probably shows, also, a condition which we have known for several years back—that our percentage of increase in new customers gained must become smaller each year, because we are gradually catching up with the number of unwired buildings in the country.

These figures show the effect of only six months of the present state of business. Since the period covered by them our industry's output has on occasion actually fallen below last year's mark, and the latest reports show it to be approximately on a line with last year's. I do not see any reason for pessimism in that fact. It does, however, emphasize sharply the state of affairs I discussed last year at Atlantic City. Our industry has gone a very long way in rate reduction. It is expending annually huge sums for new construction for the extension and improvement of service. We have every confidence that the prevailing conditions in general business are only temporary, that they will improve and that the sales of industrial power will presently increase. Nevertheless, our industry cannot indefinitely continue to reduce rates and make its great expenditures for new construction if output remains at present levels and the number of new customers continues to decline.

For several years the relation between investment and revenue for the industry has been such that there was a gradual lengthening in the period of capital turnover. If our one-billion-dollar construction budget this year is carried through and revenues for the entire year do not show considerable improvement over the showing for the first quarter, the rate of turnover for 1930 will be only once in somewhat more than six years.

Now this is a state of affairs which deserves our very wisest thought and our most vigorous efforts to correct

Turnover

Sane Regulation

By MATTHEW S. SLOAN
President National Electric Light Association

DECLARES utility budgets exceed promise. Twelve months' output increased 9 per cent. Industrial sales curtailment offset by other business. Urges increased commercial effort to compensate for expenditures and existing usage. Conditions under which new capital can be obtained. Basis for sane regulation and wise administration.

it. There are two aspects of it which demand consideration. The first is a matter which is within our control. It is necessary for us, in common with all business now, to extend and intensify our sales efforts of every nature. Our industry, I believe, is at present thinking commercially for the first time as a body. We need to think harder and work harder. With so large a part of our business competitive—industrial and commercial power—and with competition of all business for the consumer's dollar so sharp as it now is, there still are markets to be developed which we have not exhausted. There are sales to be made in them which will increase our output and our revenues and improve our load factor, without adding too heavily to our investment in plant and distribution facilities. Particularly is it necessary to continue to magnify the increase in the use of energy in homes by improved rate structures, by more extensive merchandising of energy-using appliances, by wider education of home makers on the labor-saving, time-saving, money-saving features of electric appliances. What can be done in this field is indicated by the fact that the increase in the average domestic use of energy in the twelve months I have analyzed more than offsets the decline in the number of new customers.

The second aspect of this situation involves matters of public policy and official action, requiring wise and public-spirited co-operation between our industry and public officials. Whether the present slump in power output lasts weeks or months, it will be, after all, but a temporary condition. America is basically prosperous. America is growing, and our industry must grow to serve American business and American homes. Large capital investment will be needed next year, and all down the long procession of future years, to provide the electric service our nation must have. Our industry must raise this capital, but the public's needs, more than ours, require that it be raised certainly and on fair terms. If the ability of our business to serve be limited or choked by difficulty in obtaining new capital, the business will feel it, but the public, requiring the highest type of service, will feel it worse.

Can the necessary new capital be obtained on fair terms? Yes, beyond a question, under fair and proper conditions. Those conditions, as I see them, are: First, a power and light business wisely and economically operated to supply ever-improving service at the lowest possible prices, with due regard for the interests of the general public, the consumers and the investors; second, a power and light business wisely and sanely regulated, with due regard for the public's requirements for more and better service and for our industry's necessities.

We can answer for this industry. We can and must make it a business supplying the best possible service at the lowest possible prices, and beyond that, an agency of public service, meeting all its obligations to society in the highest and fullest sense. It is for the public, and particularly legislators and public officials, to answer for the public policies involved in this situation. The laws and the machinery of public utility regulation are being recast to conform them to rapidly changing conditions in the utility field. That is eminently desirable and in the public interest. Unfortunately they are being recast amid a clamor of extremist theories, demagogic attacks and political maneuverings. We are told by newspapers that the "utility issue" is to be a feature of coming state elections, and perhaps of the next presidential election. That is eminently undesirable and is not in the public interest. Economies will not be promoted thereby. Sales will not be increased thereby. Rates will not be lowered thereby. Capital will not be made more available.

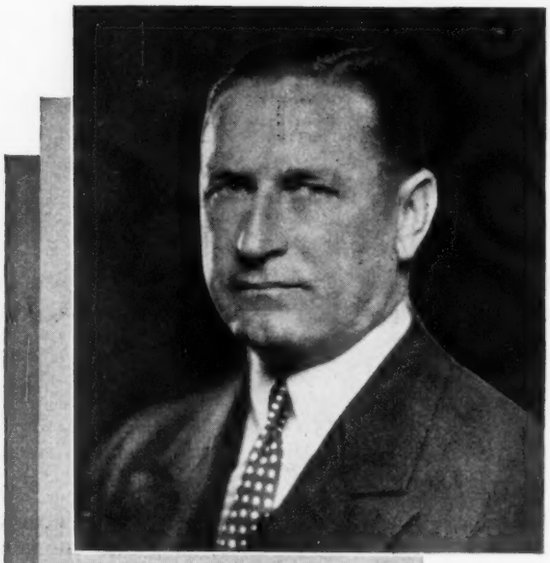
Public utility regulation is a matter of sane laws, wise administration and constant adherence to sound economic principles, or it is a farce. Extremist theories and political campaigning injected into it can only engender heat which burns out truth. Neither social justice nor business welfare can be promoted under such conditions.

What is needed now and for the future is not heat or hate or demagogy, but the application of economic principles through laws protecting the public without penalizing the utilities—laws which will command and reward the confidence of the investor without robbing the consumer.

Such laws can be framed. Our industry can be counted on to co-operate in framing them, contributing to the discussion its experience and special knowledge of the business in order to help reach a result truly serving the public welfare. Fair, impartial, courageous administration of such laws can also be obtained.

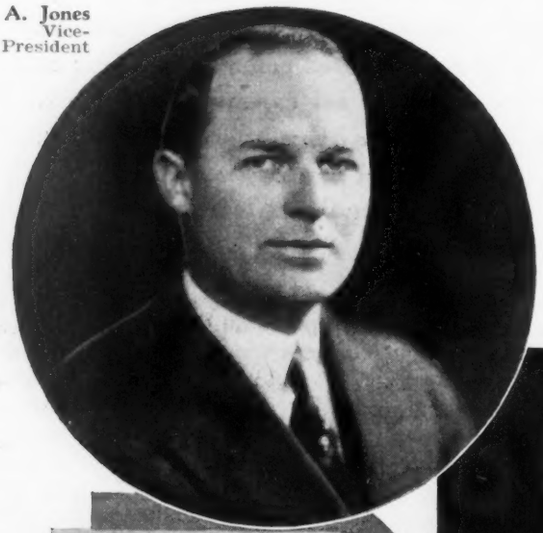
N.E.L.A. LEADERS

1929—1930



M. S. Sloan
President

W. A. Jones
Vice-President



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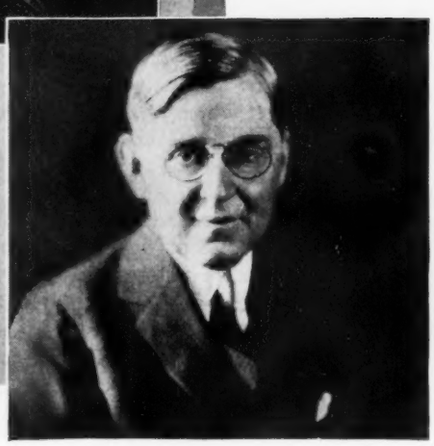
Managing Director



Marshall E. Sampsell
Vice-President

J. F. Owens
Vice-President

N.E.L.A. Policies on Consolidations and Regulation*

By P. S. ARKWRIGHT

Chairman N.E.L.A. Public Policy Committee

IT IS inevitable that the size of the industry should attract attention. Indeed, for many years close observers in our own ranks have predicted that, notwithstanding great economies and public benefits, the danger which confronts the industry is that its phenomenal growth will outgrow public understanding.

Having witnessed tremendous expansion in other industries and experienced savings which go with mass production, the supposition was that the public had accepted size as a corollary to economy and that it no longer feared it.

However, some of the criticism which has been directed against the electric light and power industry can be attributed to its remarkable growth.

All the canons of economics indicate that in the public utility business consolidations and mass production are prerequisites to sound growth and low cost of service.

Were the public in possession of the facts, we submit that this suspicion would vanish. So long as misunderstandings persist, the industry should not only continue but, by every means advisable, increase its work of bringing to the attention of the public the facts regarding this industry and the economic principles governing it.

Large electrical operations economically sound

The policy of effecting physical interconnection of electric systems to embrace widespread geographic areas has been continuously advocated by your public policy committee. It is basically sound and economically unassailable. Moreover, it has been urged in the public interest by state regulatory commissions and by public officials.

Experience proves that interconnection and co-ordination make for greater utilization of investment and facilities, for economy in operation, and for greater reliability of service. The industry shows wisdom in following this policy of electric consolidation.

The lower costs and better service which have accompanied interconnection amply justify the continuance of the policy. Without interconnection and co-ordination of the facilities by merger or through the common control by the holding company high-grade electric service would not have been available to the smaller towns and villages or to the farms of the country.

Reliable, abundant and low-cost power is vital to the nation's industries, communities, homes and farms. This quality of service is, in turn, dependent on large-scale production and managerial, financial and technical ability, which large companies alone can command.

Public regulation, by commissions devoting their time exclusively to this work and staffed with competent technical and legal advisers, has brought benefits to the public and economic values to the nation. With regulation by state public utility commissions determined upon, our policy is to co-operate with them.

We desire that regulation should be established on such a sound and equitable basis as to commend itself to the public served and not deny to the public utility the opportunity to earn that reasonable rate of return on the value of the facilities devoted to the service necessary to enable it to secure the additional capital needed to make the improvements and extensions requisite to provide increasingly efficient and economical service to ever-expanding territories.

The questions of interest to the public are, first, complete service from a geographic standpoint; second,

**Excerpts from report of public policy committee.*

satisfactory and efficient service; third, lowest reasonable rates.

Regulation, to be effective, must be exercised as closely as possible to the consumer.

It makes little difference whether the utility dealing with the customer be large or small; whether this company generates the electricity in its own power house or transmits it from a distance; whether the company procures it from within or without the state. This has been the theory of regulation up to the present, and under it electric service has expanded and rates have decreased.

In 1924 the public policy committee thus advised the membership of the association: "While we should certainly not recede from our right of appeal, still, whenever possible, it would seem good public as well as business policy to do everything within our power to settle our differences with the commissions and only appeal to the courts as an extreme resort."

An examination of the record will prove that this recommendation has been put into practice generally throughout the electric light and power industry.

Research—assurance of progress

Assurances of constantly improved and progressive electric service rest on continuous experimentation and research in the laboratories of the electrical manufacturers and in field experimentation and observation by the electric utility companies. There is ceaseless search for new applications of electricity and improvements in the whole art of its production and distribution. Beyond this, the industry recognizes the value of continuous research in the field of pure science, where fundamentals and truths, often obscure in their immediate application, are discovered, for upon research in pure science future progress basically depends.

The National Electric Light Association, in behalf of its members, therefore reaffirms this policy of vigorous and constant research.

Your committee was privileged to participate in the conferences called by President Hoover at the White House last fall. He was advised that the electric light and power companies planned to expend $865,000,000 during 1930 for new construction in extension of service facilities. Recent information indicates that the estimate was too conservative and that the amount to be expended will exceed one billion dollars. This construction program is actively under way in all sections of the country.

Large expansion in last five years

The construction program for 1930 is among the largest of any basic industry in the nation and in itself characterizes the rapid growth in electric service. Nor is it out of step with past performances. In the five years since we met at San Francisco five billion dollars have been expended in new power houses, transmission and other facilities, and the investment which stood at six billion dollars in 1925 has grown to eleven billion dollars.

Future electric requirements will be large

The best judgment is that adequately to meet the requirements of the nation during the next ten years the output of electricity will have to be doubled. The benefits accruing to the whole national life—economic, industrial and social—attainable from this larger use of electricity are beyond visualization.

Public confidence essential

It is clear that to raise the large sums of money required now and year by year, the utility companies must merit and receive the high degree of confidence which has enabled them to finance these large programs of expansion. Investors in the business, now numbering more than three million, have shown this confidence.

Obviously, if by unduly restrictive legislation, political abuse, or unjustifiable attacks on the utilities, public confidence is disturbed electrical development will as a consequence be rendered more difficult, less economical, and wider extension will be restricted. In such a situation the utilities will be injured beyond question, but the injury and the deprivation to the public will be infinitely greater.

In concluding this report we recommend that the member companies continue to show the same initiative and performance in public service which have characterized them in the past. We have assumed the responsibility of supplying the American public with the best and most complete electric service at the lowest rates consistent with good credit standing of the industry. Your committee has confidence that the American people will support and sustain the industry in fulfilling this duty so long as performance continues to measure up to this responsibility.

Has Regulation Protected Public Interest?

By WILLIAM A. PRENDERGAST

Former Chairman
Public Service Commission of New York

THE protection of the public interest has been furthered in no more substantial way than through commission surveillance of capital issues. One of the evils which called forth commission regulation was what was commonly known as "stock-watering," or the issuance of securities without adequate property values behind them. Regulation cured that evil to the full extent that state commission power extended. . . . No body of our business men were quicker to perceive this than the bankers of the country, especially those who marketed the securities of the utilities. It is not too much to claim that a commission approval of an issue of securities is regarded as the equivalent of a guarantee of the basic value of the issue.

The expenses of rendering service should be equitably distributed upon each class of customers.

Those whose patronage is compensatory should not be burdened with the cost of rendering service to those whose business is non-compensatory.

A better equalization of charges has always been followed in the electrical industry than among other utilities, although even in that industry it has been well known that better equalized rates which will prove a stimulus to greater usage of current may be devised and are being constantly developed.

State governments have been reluctant to provide adequate financial support for the conduct of the work of the commissions.

To the extent that this absence of support has restricted the operations of the commissions, the appropriating authorities, legislatures, and governors are chargeable with the blame and responsibility.

They are also responsible for the failure to increase the powers of the commissions from time to time, as public necessity suggests.

Success and progress have their advantages and also their penalties. When politicians perceive any business, especially a public utility, enjoying prosperity, they proceed to exact the usual toll. The latter invariably takes the form of attacks upon the character of the management and the revenues that are being secured. But the politicians are not alone in these attacks when a public utility is the issue. They are joined by a certain type of economist who sees in the prosperity of a utility the evidence of a wrong that is being done to its customers.

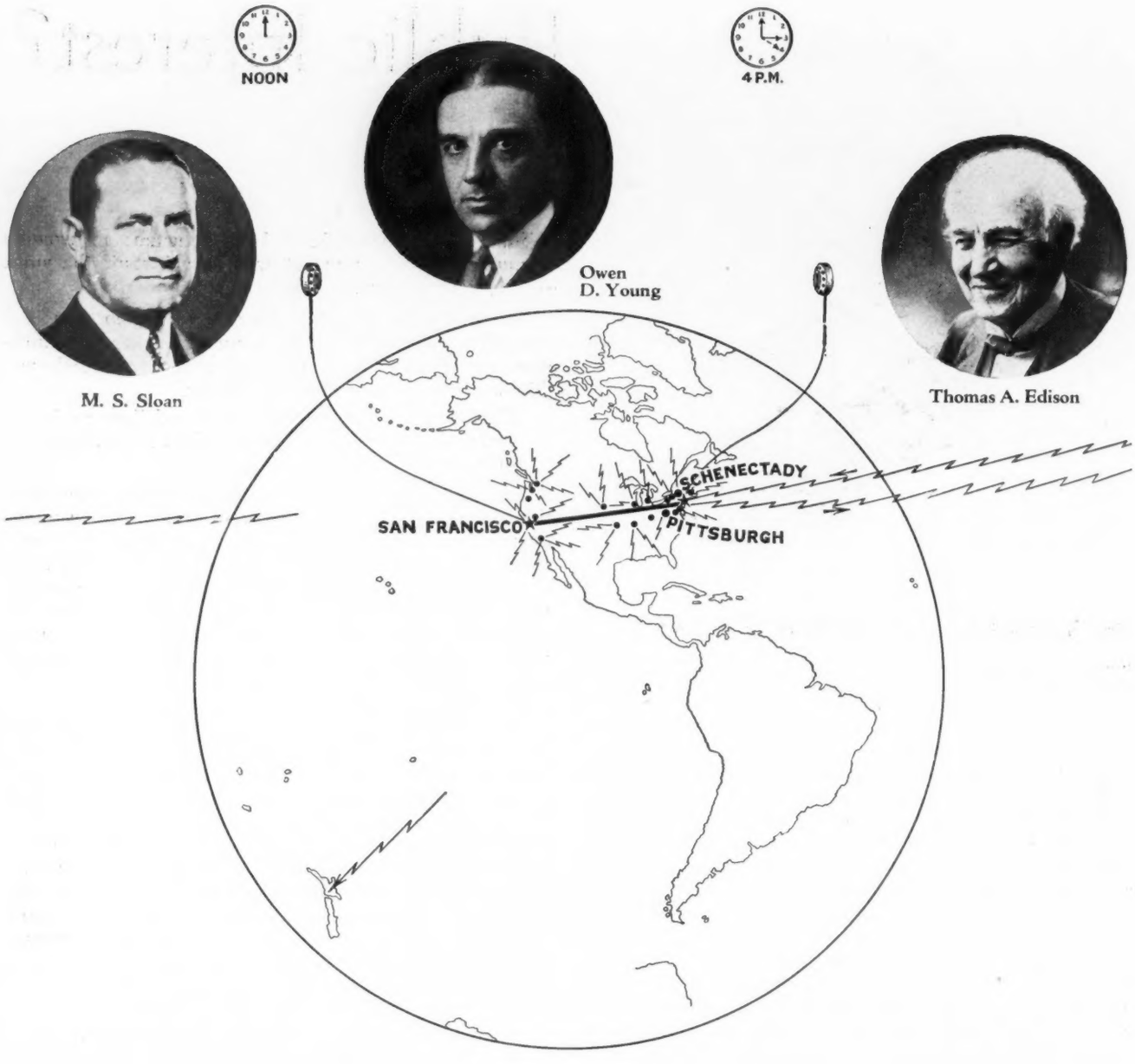
Hence for the past few years we have been told that electric rates are too high, even in the face of the constant reductions that have been going on. So the politicians and economists who see in "power" a good "talking point" have manufactured a "crisis" in the electrical industry and also a collapse of regulation. It has been aptly said that of all synthetic products, a manufactured crisis is the least satisfactory substitute for the real thing. It is noticeable that, despite these crises and collapses, the electrical industry is maintaining its primacy against all the unfavorable conditions incident to a marked decline in the volume of general business.

Who wants public ownership and operation?

Positive evidence is available that communities which have followed the idea of public ownership are rapidly abandoning it for private operation, and many cannot generate as economically as private companies.

The theory that regulatory commissions should be used to advance the interests of one class of persons to the disadvantage of others may serve political ends for a time, but experience will dispose of it as opposed to the principles of this democracy. In the main, the regulatory commissions have acted with wisdom and toleration. They have not been prosecutors or persecutors, and the best interests of the public require that they should never be used for these purposes.

Distance Annihilated in



THE ends of the world were brought together at noon, Pacific Coast time (9 p.m. Berlin time), June 18, when internationally known speakers in London, Berlin, West Orange, N. J., and San Francisco addressed both the N.E.L.A. convention in San Francisco and the World Power Conference in Berlin by combined wire, cable and radio telephone messages made audible to radio listeners in the uttermost parts of the world. The program lasted 45 minutes (each speaker occupying about five minutes), and could be heard throughout Europe, as well as remote places such as Japan, Australia and New Zealand.

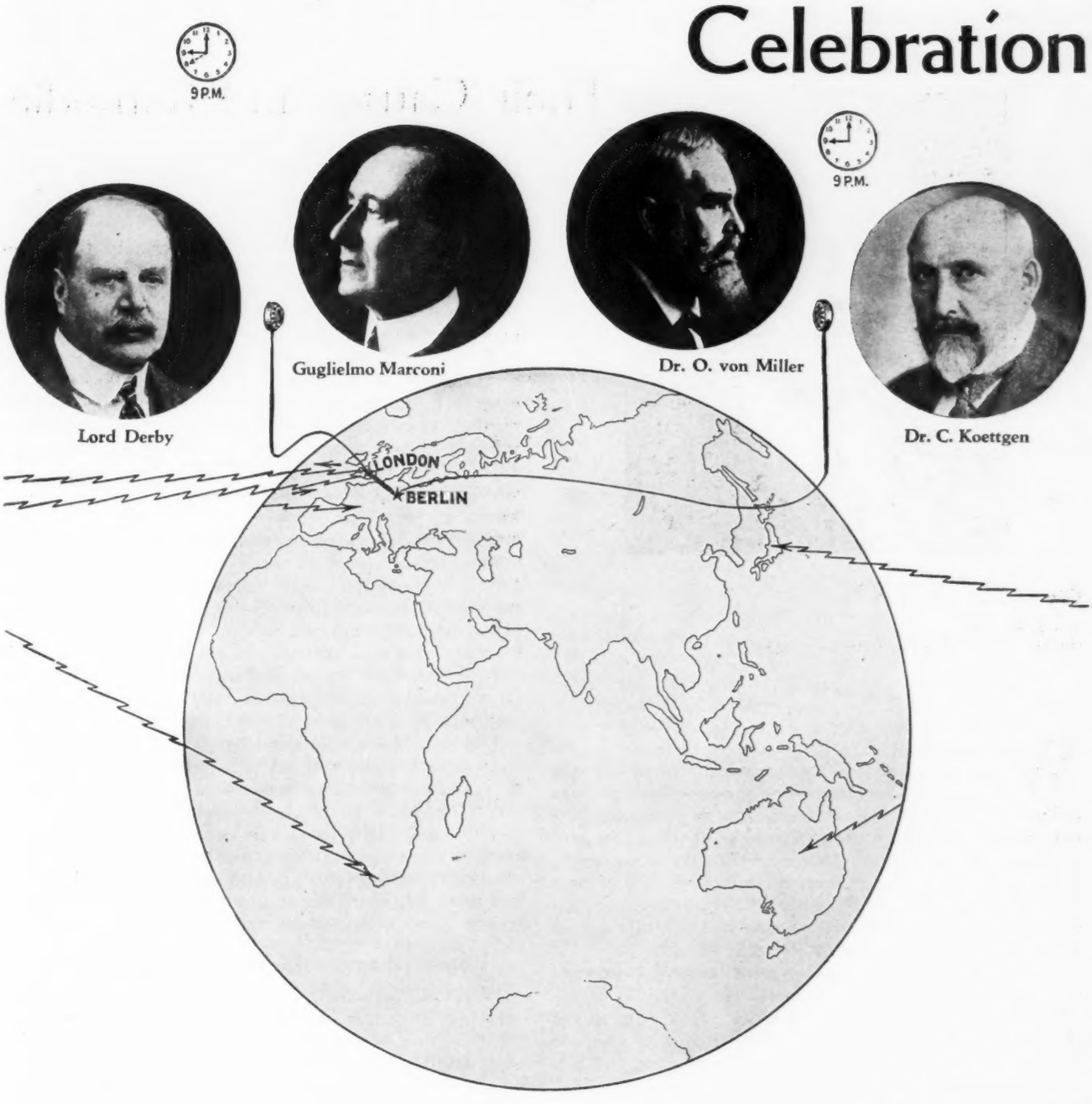
After a brief introduction from the San Francisco Exposition Auditorium by Phillips Carlin, the following speakers were announced in rotation:

M. S. Sloan, president N.E.L.A.—San Francisco.

Dr. Carl Koettgen, chairman banquet to delegates—Berlin.

Lord Derby, first president World Power Conference—Surrey, London.

N.E.L.A.-World Power Celebration



Dr. Oskar von Miller, honorary president World Power Conference—Berlin.

Senatore Guglielmo Marconi—London.

Owen D. Young, chairman General Electric Company—San Francisco.

Thomas A. Edison—West Orange, N. J.

A most extraordinary international combination of communication facilities was involved, including the National, British, Holland and German Broadcasting Companies, International Telephone & Telegraph Company and American Telephone and Telegraph Company. Land wires, submarine cable, low- and high-wave length radio, all sorts of broadcasting stations and telephone and telegraph stations figured in the exchange of messages. Red, Blue and Pacific-Northwest broadcasting networks were connected, as well as supplementary stations. Messages from this country were transmitted by short-wave radio to foreign countries by the I.T.&T. Company's stations in New York, by WGY (Schenectady), KDKA (Pittsburgh) and Bound Brook, N. J.

Trends in Engineering Costs—

Their Causes and Remedies

By A. H. KEHOE

Electrical Engineer
United Electric Light & Power Company

WHILE the situation is not yet critical, the ominous sign on the technical horizon is the continued increase every year of the average dollars invested in our systems for each kilowatt of generating capacity. Despite a gradual reduction in generating plant costs from 1922 to 1929, which amounted to approximately 12 per cent, there have been increases in total system costs of 20 per cent. These have reached a total of $375 of system investment for each kilowatt of generating capacity installed in 1929.

If this were the sole measure of technical achievement, there would indeed be cause for concern. However, increased operating efficiency, lower operating costs, better quality of service rendered, extension of systems into sparsely loaded sections, and a gradual improvement in use of installed capacity. As an indication of this trend, the system investment required per kilowatt-hour sold has shown a gradual decrease, particularly since 1926, from 15 cents at that time to 14 cents investment per kilowatt-hour sold for the year 1929.

From segregated figures of average investment costs* it is found that all of this reduction in the investment required per kilowatt-hour sold has occurred in power plants and in certain miscellaneous items, such as service buildings, offices, etc. None of it is found in transmission, substations or distribution. These last three items have maintained substantially the same investment per kilowatt-hour sold for the past four years. The reduced investment costs for the entire system are thus due to gains in the power plants and miscellaneous items.

To the above improvement should be added the yearly reductions in both production costs and other operating charges to obtain the optimistic view of our system cost trends. Operating expenses per kilowatt-hour sold were reduced 18 per cent in the period between 1922 and 1928. The relative influence of the various factors which contributed to these results cannot be accurately estimated with the exception of economy of fuel consumption in steam-generating stations. Such steam stations comprise at present over 70 per cent of our total power station capacity, and they produce over 60 per cent of the total kilowatt-hours. As an index of the gains made, the amount of coal required to produce a kilowatt-hour was lowered from 2.49 lb. in 1922 to 1.76 lb. in 1928, a reduction of 29 per cent. Having fewer power plants in operation has lowered operating expenses 10 per cent in the last three years.

The use of large, modern boiler and generating units for longer periods without overhauling reacts favorably on operating and maintenance costs. Increasing use of non-attended hydro plants and substations, remote control of such plants, and the more general adoption of automatic equipment in attended stations have also reduced operating costs. Finally, the substantial increase in the unit size of electrical equipment has resulted in improved operating efficiency.

Improved use of facilities brings economies

While no reductions in investment per kilowatt-hour sold were obtained in transmission, substations and distribution, yet the improvements in the use of installed capacity, or, in other words, the increases in capacity-use factor, were larger in the cases of transmission and distribution than for generating stations. The elements which make up capacity-use factor are load factor, maximum loading in respect to capacity, and system losses. The gains in transmission and distribution apparently were utilized for other purposes than to lower investments in these two cases. It is quite likely that improved reliability absorbed most of them. In the case of substations, however, the capacity-use factor was 10 per cent less in 1929 than it was in 1920. This will be discussed later in connection with capacity costs. For the entire system there was approximately a 15 per cent improvement of capacity-use factor between 1920 and

**Based on data compiled by N.E.L.A. statistical department covering entire country's electricity supply industry. Figures for individual companies will depart from the averages used.*

1929. To obtain this improvement, a considerable gain has undoubtedly been due to efficient operations within systems themselves.

While better loading of all equipment is being had each year, nevertheless the losses in supplying the load from generating station to our meters has not shown any appreciable changes in the past few years. These losses, of course, include the energy used by our companies, which have doubtless been increasing in most cases.

Modern power stations with interconnections have been set up to gain the benefits of diversities between large districts, and, similarly, transmission lines and substations have been more fully loaded to their rated capacity as experience has demonstrated their reliability. Future gains of this character will in most instances be from improved loadings of substations and distribution system rather than from generating stations. Modification of the distribution system to improve its loading to capacity can be undertaken in many cases without appreciably adding to present losses. A further improvement in losses is also to be expected in many parts of distribution systems where the use of larger-sized distribution units will lower losses and will take advantage of the diversities between individual loads.

Some of the largest possible gains can doubtless be obtained from increased loads and improved district load factors, as such additions will generally improve the capacity-use factor of the entire system.

New equipment which will establish additional or improved results from the utilization of electricity is one of the promising engineering fields at present. For instance, to mention but a few applications, we have had household refrigerators developed, electric ranges perfected, water heaters improved and socket-powered radio introduced in the past few years. There are undoubtedly many other applications which can be produced with proper research and engineering development. In particular, as an example, I wish to cite as one such technical possibility the production of air-conditioning equipment with the later possibility of either cooling or heating automatically by a reversible refrigerating cycle. Such equipment might easily give future sales of greater magnitude than any that have been obtained from new developments in recent years. There are doubtless many other applications which await the proper technical attention to make them become commercially practicable.

In addition to the development of utilization equipment, there is a fertile field for technical improvement in utilization wiring. The expense involved in wiring today is acting as a heavy drag upon increased utilization. While such charges do not appear in our system statistics, the costs for utilization wiring and equipment are known to be far in excess of our total system cost.

There are at present several promising modifications in wiring which should be given trial installations in order to remove the present financial restrictions to the use of electricity and at the same time to make both funds and wiring available for more utilization equipment. Ample research and engineering ability should be encouraged to participate in such developments. Wiring with a bare grounded neutral is one such proposal which should be given sympathetic attention. Other possibilities are the bare concentric polarized system and also any reasonable variations of the present nonmetallic types. Adequate advances in this field will make increased sales and improved load factors almost a certainty and thus produce further reductions of our system costs.

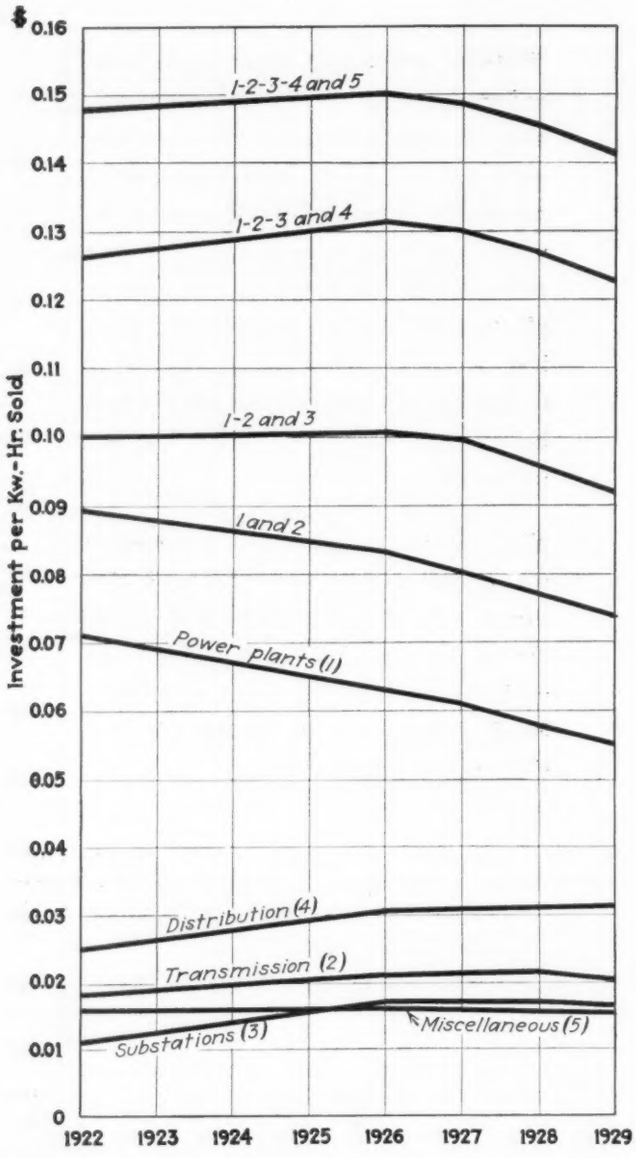
WHILE operating costs have been reduced, quality of service improved, lines extended into sparsely loaded sections, and use of installed capacity gradually improved, total system investments have increased 20 per cent since 1922. Unit costs of power plants have been reduced 12 per cent, but those of other elements, like transmission, substations and distribution, have increased as much as 40 per cent.

THE author analyzes economies which have been effected and the causes for the increased costs, and directs attention to factors that have to be given serious consideration if fixed charges are to be retarded in their upward flight.

While we can be reasonably assured that additional satisfactory technical results are still to be expected, due to improving capacity-use factor, together with lower production and operating costs, yet the continued improvement noted in each of these conditions has a limit which is not far beyond present-day values. The time has arrived for engineers to produce improvements in system capacity costs which will modify the trend.

It appears reasonable to expect that with increasing loads taken on our average system, capacity cost per kilowatt of installed generating capacity should be reduced rather than increased.

Let us now examine the average results of investment cost per kilowatt, which in totals have increased from $312 in 1922 to $375 in 1929, or 20 per cent. In other words, the industry had invested in 1929 $11,050,000,000 in plant and equipment, which in terms of the 29,500,000 kw. of generating capacity makes the average investment $375 per kilowatt of installed capacity. This increase has occurred while our kilowatt-hours delivered were expanding at a rate each year of more than 11 per cent, or to approximately $2\frac{1}{4}$ times their 1922 value. While these large additions in output were taking place, instead of having a decrease in unit investment, our system unit costs were increasing 20 per cent. Apparently, the criterion of massed production that increased volume or capacity will lower unit costs is being masked by some other factors which have much more weight in the case of these averages, but which are



Average investment per kilowatt-hour sold is falling
(Light and power industry of the U. S.)

not easy to discern without breaking down our figures into their component system parts.

If system unit investment costs from 1920 to 1929 inclusive are allocated into power plants, transmission, substations, distribution, and miscellaneous, it is found that power plants show a decrease in costs of 12 per cent during the period, while each of the other items, except the miscellaneous, were increased more than 40 per cent each. The miscellaneous item was very slightly increased over the period. From such results it might be inferred that our power plant engineering had been more effectively performed than was the case in other parts of the system, as its unit costs show reductions with large yearly increases in loads, as should be expected on the mass production theory. However, there are certain trends in such costs which should be of particular interest to generating station engineers or any one when determining the location of our power stations.

For example, if we add to the unit costs of power plants the cost of transmission, the latter figure being approximately one-third the amount of the former, there is still a small declining yearly trend for the two parts of the system combined, although the unit transmission costs alone have increased 40 per cent. This shows that the combined unit investment costs have decreased not only for production but also for transmitting electricity away from the stations. However, if we also add to these two items the unit costs for substations, we find that the yearly trend, instead of declining for the three, is rising.

It thus appears that with our increased concentrations in modern generating stations and our interconnection of systems, we have also been using expensive substations to step down the power for distribution, so that over a period of years we have increased rather than lowered that part of system unit investment costs which is necessary to deliver our power for use to existing centers of distribution.

While other gains which have been previously discussed are sufficient to justify such conditions, I wish to emphasize that station designers, when considering power plant projects, should have in mind the unit costs necessary to deliver the power to points of delivery to the distribution system rather than to the station busbars. Remote location of stations, which necessitates high-voltage transmission, also requires stepdown substations from this voltage, and both of these parts of the system have to be considered in determining the unit costs for developing such locations. In the case of substations, it should be noted that not only did the capacity cost increase but the capacity-use factor also was 15 per cent poorer in 1929 than in 1926.

The cost of distribution, as previously stated, has also increased in the period from 1920 to 1929 more than 40 per cent. It is now over $80 per kilowatt of installed generating capacity, with a relatively large part of the country already covered by distribution constantly increasing in density. Such a large increase must be due in a large measure to other costs than that required to expand the area of our systems with rural service and the like. While the expansion of system areas for such loads runs up average costs, the amount of this has been relatively small compared to increased loads and to increased number of customers in areas previously covered by distribution facilities. For instance, the entire investment in rural distribution in the year 1928 was but approximately 15 per cent of the total sum invested in distribution in the country. Thus the greater part of the 40 per cent increase in distribution costs must have occurred within the area reached by distribution facilities previous to this increase in unit prices.

It is well known that there have been distribution expenditures made in many instances in the more densely loaded areas in order to make the service more reliable and to accomplish a civic betterment. Such developments tend to increase present unit costs, but do not need to continue to do so if the development is made in a way that future additions can be supplied without high additional costs. I suspect that, in general, most of our increases in costs have been occurring in the parts of each system which have the greater load density. From results obtained on some systems it also seems probable that considerable gains can be made in our general distribution results, both in lowering investment costs

and in improving the various operating results, such as, better loading of equipment, reducing losses, and reducing maintenance.

System unit cost reductions of more than 25 per cent are possible in many instances. To do this, the dense loaded parts of these systems must be given the closest attention as additions or changes are required.

It should also be possible in the sparsely loaded areas to adopt the design improvements which are being formulated by certain of the companies for such conditions. The numerous suggestions in the series of reports being made by the association's rural service committee are but one of a number of instances of this kind.

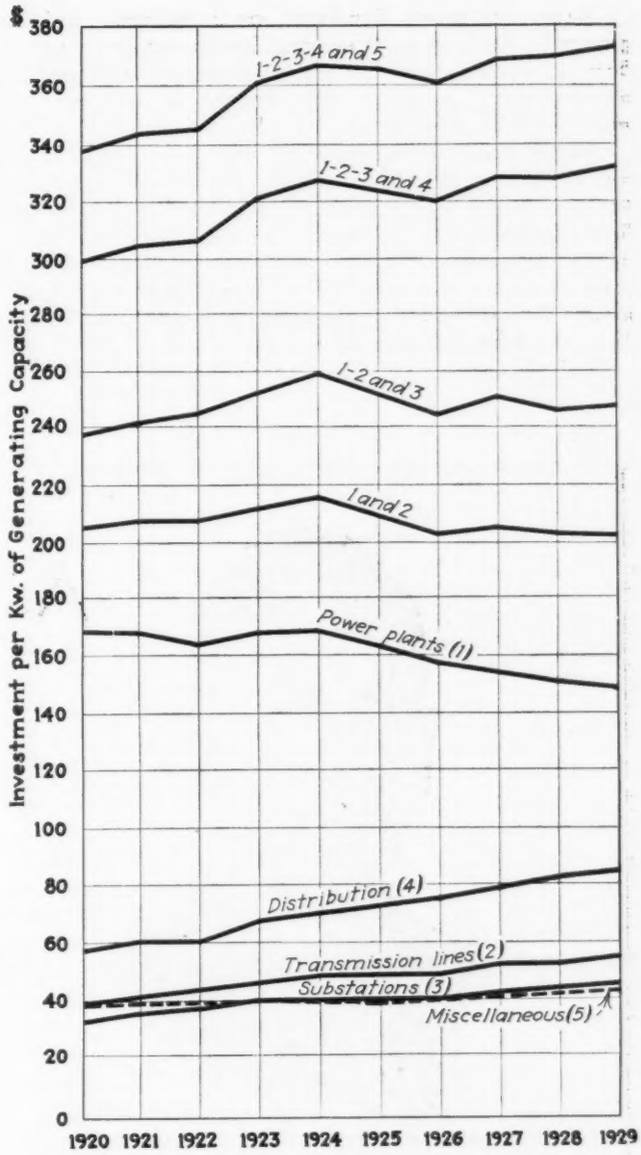
It is evident that our improvement in capacity-use factor, both in the case of distribution and also for the entire system, has made it possible to devote money to distribution system investments in much larger amounts than could have been allowed solely from a capacity standpoint. The amount of investment in distribution systems per kilowatt-hour for 1929 was more than 3 cents per kilowatt-hour sold, and has been about stable at this figure for the past four years. We have thus been reinvesting all of our past gains in distribution back into the system itself. As we may expect to reach the saturation point in many of the factors which have previously favored us, it is important for distribution engineers to realize that their important problem today concerns itself with establishing the means to be used in obtaining lower distribution system investment costs for the future.

As I see it, the combined engineering of power plants, transmission and substations has resulted in systems which will deliver power to the centers, where it is handled by the distribution system, with corresponding capacity investment costs that are increasing slightly each year. Similarly, our distribution engineering has resulted in systems which show large increases in unit investment capacity costs.

In the case of the power-producing elements first mentioned, there have been lower investment costs obtained per kilowatt-hour sold, some of which can be credited as an achievement of the engineers involved in design and operation, but to a considerable extent, however, these gains are probably due to the improved volume and load factor of our sales. In the case of distribution, no such gains in unit investment costs per kilowatt-hour sold have been made. Any potential improvements due to increasing capacity-use factor or any possible reductions in investment costs due to large additions to capacity have failed to appear. It must be assumed that system expansion in sparsely loaded districts, changing from overhead to underground, and improved reliability arrangements have entirely absorbed them.

With definite limits to improved capacity-use factor almost reached under present conditions, it is evident that our engineering should be earnestly directed to the reduction of unit capacity costs, particularly in districts where our systems are expanding.

The goal expressed by the slogan of the National Engineering Section for the past few years of "More system capacity per dollar of investment" is well chosen, and merits the closest study by every one.



Average system costs show mixed trends

(Light and power industry of the U. S.)

To accomplish important results, all of our system developments should be based on sound but simple fundamental plans which contemplate expansion over a period of years. Such planning should forecast the results to be expected at any stage of development, and should be revised from time to time as conditions warrant, to get the best possible system results. Some existing types of equipment, or even parts of a system, may have to be eliminated in certain instances. In the majority of cases, of course, changes of a fundamental character cannot be justified without consideration of system conditions several years in advance. Nevertheless, as soon as planning for a number of years is undertaken, it is possible to design so that unit costs will be considerably reduced from those which previously obtained.

In power plants themselves, planning of this character is usually contemplated, but in many cases there is lacking a co-ordinated plan of development as between stations and for the entire system.

There are being developed on a national scale at present several important simplification projects, and in local situations there are doubtless many such possibilities which, if applied, would reduce in each case our unit costs to some extent.

Progress in transmission and substation design is being made, particularly in standardization and simplification. Standard installations, where used, are known to lower present-day average costs. In distribution there are great possibilities for reductions both by adapting present standard equipment to a well-planned program of development and by developing low-priced substitutes for expensive methods now in use.

Such designs as will avoid extra steps of transformation, either by eliminating substations or otherwise, result in lower investment costs and high operating efficiency. Recently, underground distribution developments have been proposed with much cheaper types of construction than the ordinary conduit type.

If low-cost designs are based on a simple, standard but nevertheless rugged type of construction no losses will be had in efficiency or operating costs, and many improvements are still possible by such means, both in urban and in rural types of distribution. In almost any system there can be devised means to make many possible improvements which can be undertaken once a basic plan of future developments is laid down for increases in load and accompanying expansion.

A. W. Robertson* Observes

WE ARE learning in recent years that it takes more than just action and a high-pressure salesman to sell either eiectric current or appliances as broadly and effectively as our intelligence tells us they should be sold. *Market studies and market analysis are becoming the order of the day.* But I would like to see a study made of why people as a rule treat electric current as though it were an expensive product.

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Perhaps we are using too much high-pressure salesmanship in our efforts against certain elements of a political nature and need to pause and study the problem intelligently with a view of determining where the resistance is and then direct our efforts more intelligently to that point. It is conceivable that the various governments which represent the people whom we serve have perhaps as erroneous an opinion of our business as we think the housewife has who is excessively frugal in the use of electric current, and if this *error in the political mind* could be discovered it might be corrected to the very real advantage of the public and our business.

I see difficulties for the industry in our *cost of distribution.* We must do everything possible to make it easy and less expensive for both appliances and current to flow from the source of supply to factories and homes. Our most careful thought and attention must be given to this problem. It hardly seems justified to increase the cost of appliances 100 per cent from the factory door to the threshold of the home, and yet this is the cost in some cases and it does not seem easy to reduce it.

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The public utility and the manufacturer have been too engrossed in each other to observe some of the things being done by third parties which affect our joint business. For instance, it is tremendously important to be able to reduce the price of a domestic heater $5 or $10 or to reduce the price of electric current so as to make the use of appliances economically possible, *but* we may neither of us reap the advantage of these savings if the cost of installing the stove (and by that I mean the wiring and connections and other necessary facilities) is made so high that the consumer will not buy the stove.

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It astonished me, and it may astonish you, to learn that the cost of installing electric ranges in the United States varies from $25 to $75 per range. Recently the cost of such installation in a certain city increased from $45 to $60.

*Chairman Westinghouse Electric & Manufacturing Co.

Achievements—Not Promises

By J. F. OWENS

Vice-President National Electric Light Association

UNLESS a human being is understood by those with whom he comes in contact, his efforts must fall short of full realization. The same thing is true of an organization of human beings.

Material things are necessary, but they are of value only as they contribute to the comfort, the progress, the convenience, the happiness of mankind.

The Public Relations Section's most important function is that of measuring the extent to which the industry as a whole is reaching its full possibility in contributing to the spiritual, social and economic advancement of society and the nation. In the carrying out of this objective it reaches forth into every organized unit for thought, for suggestions, for accomplishments, for achievements, and, as a clearing house, passes on the record of achievement to other units.

As we take stock today, we must admit that in the last three or four years we have lost some of the esteem in which we were held by those whom we serve. There is in many quarters, without question, a feeling of suspicion. It has not as yet developed into distrust, but is, rather, one of apprehension.

I think it is fair to state that the public in general wants to believe in us; wants to believe that we are doing an honest job. I think it is also true that the public has a very hazy idea of the job that we have done and are doing.

It matters little that every town in the United States having a population of 5,000 or over has electric service; that 97 per cent of all towns between 1,000 and 5,000 population, 50 per cent of all communities between 250 and 1,000 and more than 25 per cent of all communities having less than 250 population enjoy the same character of electric service as do the metropolitan areas. Unless this is known to the public, it is of small moment in the matter of awakening in the minds of those we serve appreciation of what we have done. That 68 per cent of the population in the United States live in electrically lighted homes, that 250,000 farms have been given electric service in the past three years, and that more than 500,000 farms in these United States now have full electric service, although an unusual accomplishment, means little unless it is transmitted into a definite consciousness in the public mind that we are on the job.

In 1918 the average household in the United States used 272 kw.-hr. at an average price of 8.3 cents per kilowatt-hour. In 1929 the average American home used more than 500 kw.-hr. at an average price of 6.2 cents per kilowatt-hour. The average rate for all electricity sold to all classes of consumers in 1929 was 2.57 cents per kilowatt-hour, which means that, after allowing for loss and unaccounted-for electricity, the producer received in the United States for all energy sold an average of 2.16 cents per kilowatt-hour.

In the past three years $500,000,000 has through voluntary reduction in rates been passed on to the customers. In the past five years 4,000,000 homes have been brightened and their labor lightened by the introduction of electricity. So well did the pioneer of 45 years ago build that today $23,950,000,000 of the money voluntarily invested by the people of the United States was placed in the electrical industry, $11,000,000,000 in the light and power division. So well did those men build that today the thrifty citizens of this nation gladly offer nearly $1,000,000,000 for the enlargement of electrical service in the United States. So thoroughly are the investors of the nation appreciative of our service that 3,000,000 of our citizens have put their savings in the care of the electrical industry.

We are being pilloried by the Carl Thompsons, the Norman Thomases and others whose criticisms find ready acceptance in the press of today. Does the constructive work of the past 45 years, the record of the past ten years, in the electrical industry justify such criticism? You and I know that the contributions to society made by the electrical industry, its record of reduced cost in operation, its record of reduction of reserve capacity through interconnection, its economies of distribution and management that have been passed on to the public through reduced rates, its encouragement and promotion

through inventive genius and research, far overbalance all mistakes of judgment and errors of omission or commission that have been made. Our industry is composed of human beings with the same failings, the same foibles, the same tendencies to error as the rest of mankind. Let us admit that there have been identified with us some whose acts may not bear the white light of day. The marvel is that with the rapid growth of this industry there have not been more.

Why is it, however, that our constructive acts are forgotten and that only our faults are held up to the public? Why is it that the Thomases and the Thompsons can inspire page after page of criticism, while the marvelous record of 45 years of achievement is forgotten?

When the nation was in the throes of a great war and not only the social order but the business structure of the world was shocked to its very foundation, when costs of production and costs of operation mounted to the skies, when the continuous production of electricity was a prime essential and abnormal demands were made upon industry and production, the electrical industry did not waver—through superhuman efforts it carried on.

In the era of reconstruction, when society was attempting to find itself, the electrical industry met the emergency. What of some of our critics in those days of trial? Was their record such in this time of stress as would warrant a feeling of confidence in them now? It is one thing to carry on in normal times; it is another thing to have the strength and courage, the patriotism and the loyalty that challenged the best that is in even men of superhuman ability. Our record is one of achievements—not promises.

And yet, with all this record, are we not at fault? With all this record, is there not the possibility that we have failed in at least some particular? Have we always realized that in the last analysis any business will stand or fall to the degree that it is built on the sound foundation of public confidence? Is it not true that this confidence can be obtained and retained only as the public is kept thoroughly informed of the acts, the plans and the purposes of an individual or an organization? Let us recognize that to us has been intrusted a very important public service. Let us realize that no matter what our motives, what our acts, what our performances, they count for little unless there is on the part of those we serve a deep consciousness that we are really doing our job better than they can do it themselves. There continues, then, the ever-present obligation of keeping the public informed. The people are the important partners in our enterprise; they are the court of last resort. With their good opinion and with their co-operation the record of the past will be but an index to what the future holds.

Our record is worth the telling. It is the job of this section to see that sentiment is created that will arouse the various members of our organization to a consciousness of the need of the telling. Through the spoken word, through the written word, in the press over our names, let us answer the charges of our critics with facts. Let us arouse the members of our own organizations, our employees, our officials, the bankers, who are in a sense partners in our enterprise, to a realization that commercial operation of our industry will exist only so long as our acts are in the public interest.

There is more at stake than merely the question as to whether or not this business of ours shall continue to lead the van of American business enterprise. There is a question as to whether or not the principle of individual initiative and enterprise as contrasted with political management, the dangers and evils of which are too many to enumerate here, shall continue to be, as it has been in the past, the principle that shall make, as it has made, American business enterprise the envy of the world.

Floral display greeting in Golden Gate Park

What's the Fuss About? Not the Electric Dollar

By EDWIN GRUHL

Vice-President North American Company

GROCERIES, rents, amusements, tobacco, candies, books, medicines, clothing, furnishings—all of the multitudinous necessities, comforts and luxuries of modern living in the household budget, with the single exception of electric service—cost more now than they did in 1913. How is it, then, that electricity, which is only 1 per cent in the average annual domestic expense and which in terms of utilization is one-fourth as costly as in 1913, can be the center of such political fury as has surrounded it in the past few years? I suspect that the reason lies in the growth of governmental expense in the past seventeen years.

Taxes directly and indirectly are the most rapidly increasing part of our cost of living. They affect every item of the household budget. In the cost of electric service 10 cents of each dollar is for tax burden.

The aggregate cost of government—federal, state and local—in 1913 was $135 per family. In 1929 this total had grown to $460 per family, or three and one-half times the cost of 1913. The phenomenal growth of the electric industry has not been without parallel. The "tax industry" has made equal strides since pre-war days! Governmental expenditures last year alone were $2,000,000,000 more than the total amount now invested in the electric industry. From 1913 to 1929 the investment in the electric industry increased from $2,250,000,000 to $11,000,000,000, and in the same period governmental annual expenditures rose from $3,000,000,000 to $13,000,000,000.

I may here point out another curious coincidence. The National Industrial Conference Board has made the most searching analyses of government expenditures and finds that "more than $500,000,000, or more than one-tenth of the total of expenditures of local governments in the United States, represents waste and could be saved each year without diminution, either in quality or quantity, of governmental services now rendered," and the board states that this is the minimum estimate of "the public's money which is dissipated annually through faulty government organization, lack of co-ordination, inefficient budget policies, and, in some cases, sheer extravagance." The coincidence is this: The half billion dollars of waste each year in local government alone would almost pay the entire household electric bill of the nation.

In 1913 the average cost of government per family was six times the average family electric bill; last year it was nearly fifteen times the average electric bill of $31. That is, for each dollar a customer spends for household electric service he has to pay nearly $15 in taxes for the cost of government.

These facts give food for sober thought.

Table I—The Electric Dollar in Comparison

	Index of Prices	Purchasing Power		Index of Prices	Purchasing Power
Electricity, residential	**73.5**	**$1.36**	**Electricity, residential**	**73.5**	**$1.36**
Cost of living	171.4	0.58	Movies	208.2	0.48
House rentals	151.9	0.66	Candy	170.0	0.59
Household furnishings	197.7	0.51	Tobacco	119.6	0.84
Clothing	160.5	0.62	Reading matter	177.7	0.56
Food—all articles	150.1	0.67	Newspaper advertising	188.0	0.53
Milk	157.3	0.64	Magazine advertising	111.0	0.90
Sirloin steak	190.6	0.52	Farm products	126.0	0.79
Potatoes	229.4	0.44	Grains	107.0	0.94
Coffee	140.9	0.71	Meat animals	151.0	0.66
Eggs	102.6	0.97	Daily and poultry	123.0	0.81
Bread	157.1	0.64	Fruits and vegetables	169.0	0.59
Butter	121.9	0.82	Building and construction	203.0	0.49
Doctor's care	200.0	0.50	Automobiles	88.4	1.13
Drugs	156.7	0.64			

*Table II—Cost of Government**

	Families	Cost of Government	Cost per Family
1913	**21,500,000**	**$2,919,000,000**	**$135**
1927	**28,006,000**	**12,179,000,000**	**434**
1929	**28,300,000**	**13,000,000,000**	**460**

*National Industrial Conference Board, "Cost of Government in the United States," various editions. 1929 figure is estimate for that year.

IMPRESSIVE THOUGHTS from Convention Addresses

THE diligence with which the light and power companies have developed business in recent years has been commendable, but, viewed as a whole, the industry has not excelled in commercial development and has been outstripped by many other newer and less essential industries in this country.

We can look into the future with a feeling of confidence that our business will not become stagnant or static, when we realize that millions of dollars are being spent annually by the manufacturers in research and development and that hundreds of men are devoting all of their time to the discovery of new methods, devices and equipments which will decrease the cost of service to the public and insure its more universal use.

W. A. JONES

WE are told that the "utility issue" is to be a feature of the next presidential election. That is not in the public interest. Economies will not be prompted thereby. Sales will not be increased, rates lowered or capital made available thereby.

What is needed now and for the future is not heat or hate or demagogy, but the application of economic principles through laws protecting the public without penalizing the utilities—laws which will command and reward the confidence of the investor without robbing the customer.

M. S. SLOAN

WITHOUT interconnections high-grade electric service would not have been so quickly available to the small towns and villages or to the farmers of the country. . . . Regulation to be effective must be exercised as closely as possible to the point where the evils which it is planned to control may occur.

P. S. ARKWRIGHT

STATE regulation has accomplished the beneficial objectives toward which the utility laws were directed. . . . Domestic rates are now 30 per cent below pre-war rates, while power rates are but from one-third of 1 per cent to 2 per cent of the selling price of the articles produced.

W. J. HAGENAH

THE amount of investment in 1929 in distribution systems was more than 3 cents per kilowatt-hour sold. We have been reinvesting all our gains in distribution back into the system itself.

A. H. KEHOE

THE increasingly higher cost levels at which additional water power can be developed and the lowering output cost of steam production are crowding water power to the prerequisite of producing prime power at larger and larger load factors.

F. B. LEWIS

IF a referendum were taken tomorrow on the question of turning over electric service to political agencies, there is no doubt that the majority for the present system would be overwhelming. However, it will not do for the electric light and power industry to indulge in any false sense of security because of the present state of public sentiment.

E. N. HURLEY

WE have, finally, what is without doubt the most important of all prospective markets, the small-town home. In fact, no matter where it is located the domestic market is obviously the industry's greatest immediate opportunity for expansion; but it is apparent that for many reasons the small-town home can put electric service to greater use than the typical metropolitan domestic establishment.

MARTIN J. INSULL

THE handling of depreciation is one of the most perplexing problems before the utilities. A solution of that question, fair to the companies and fair to the public, expressed and applied in a practical manner, would certainly be a great boon to the industry.

F. T. GRIFFITH

THE interests of the farmers of America cannot be best served by government ownership and operation of the utilities. We recognize that it would be quite impossible for any municipal power enterprise to undertake a program of rural expansion.

M. S. WINDER

THE recent claims that commission regulation has failed and the growing attacks on the various commissions constitute to a large degree a smoke screen for federal regulation at Washington and for government or municipal ownership and operation. Any one at all familiar with the various commission decisions realizes the valuable service they have performed, the various rate reductions and service improvements for which they are responsible.

HARRY REID

Commercial Opportunities Bring Obligations

By MARTIN J. INSULL

President Middle West Utilities Company

WE LOOK upon ourselves as directing the operations of the electric light and power systems. Actually we do not. The principal influences on costs and efficiency are set in motion at the other end of the power line. The switch on the customer's premises is really the control. Our costs are established by the customer's acts, by the amount of electricity he elects to use, by the time and place at which he chooses to use it, and by the duration of his use. The consuming habits of our patrons—and principally those patrons who compose the huge domestic market—really control the cost of providing electric service.

None of our efforts to reduce generating and distributing costs can affect rates as greatly as they are affected by the nature of the consumption —its volume, its distribution over the hours of the day and the density of the market.

Selling in this business is inseparable from operation. It determines the possible efficiency of operation. Sales must be carried on in the spirit of operation and emphasis laid where the efficient operation of the system calls for it. Not only generating facilities but distribution facilities as well must be considered from the standpoint of capacity and of diversity of use. It is conceivable that an increase in demand at the wrong time could either jeopardize the investment or cause an unusually high rate. The industry must not only encourage a growth in consumption; it must guide this growth from the standpoint of its effect on load factor.

The importance of load factor can never be stressed too much. Its importance becomes greater and greater as the investment in service facilities per dollar of gross income becomes larger and larger. Assuming maximum operating efficiency, rates can only decrease as load factor increases.

We must not merely sell quantities of kilowatt-hours. We must sell those kilowatt-hours that will be used at the right time. We must keep our investment working as near twenty-four hours per day as possible. We must have a load-factor consciousness in our selling program. We have, therefore, two distinctive considerations that do not enter into the ordinary sale—time and duration of use. We must cultivate the customer who will use our investment the greatest number of hours per year. To say that the customer controls cost, then, is not to relieve the companies of their responsibility of guiding the customer in his use of electric service.

Rates must recognize load factor. A proper rate schedule will take into consideration the duration of the customer's use in its relation to his maximum demand. Rate schedules are the governing force by which sales can be guided most effectively. The customer must be induced to desire a high and well-distributed consumption, and he must be adequately compensated for it.

Price reflects customer's habits of use

Sound rates will recognize the value to the system of each kind of use and the relative cost imposed upon the system by that use. Such a rate schedule will have the effect of so guiding the consumption as to react most advantageously on costs of rendering the service and therefore on the cost of the service to the customer. The price charged for electric service responds very sensitively to the consuming habits of the user. Conversely, the consumption will react to the terms of the rate schedule.

If we are to persuade the customer to use our investment for the longer hours, we must make it possible and worth his while to use his own investment over longer hours. While the effect on the system's generating capacity cannot be directly traced, it is unquestionably beneficial.

The principal scene of additional business at this time is in non-metropolitan areas. On the frontiers of elec-

tric service the market is further removed from saturation than in the larger cities. This is not only where the greatest new business opportunities are; it is also where it is most necessary that business be built up. It has cost the industry relatively more in investment to put facilities into such territories. The industry's rather bold procedure in electrifying the more remote and scattered small towns and rural sections can be made commercially feasible and can justify the investment only if consumption in these territories is built up.

Unit investments rising

The investment required to produce each dollar of revenue is steadily rising. One of the reasons is the comparative sparseness of the territory in which the more recent growth of the industry has taken place. But that is not a condition to accept without a struggle. It is rather, as I see it, a situation to meet with increased efforts to utilize our investment more effectively. The investment per dollar of income was $4.72 in 1922. Today it is very close to $6. The investment in distribution facilities in 1920 was $56.54 per kilowatt of capacity; today it is $79.71. For each customer in 1920 we invested $67.93 in distribution facilities; now that figure is close to $100. All these figures reflect the expansion of the industry into less densely populated territories and the increased investment to provide more efficient operating and improved service facilities.

If we could obtain 25 per cent additional saturation of range business and 25 per cent additional saturation of refrigerator business on existing lines, the average domestic consumption would be raised to more than 1,000 kw.-hr. annually. If range, refrigerator and water-heater business on existing lines were each increased 25 per cent, the consumption would reach the gratifying figure of 1,756 kw.-hr. per domestic customer per year.

The substantial value of these major appliances as load builders is indicated by the average annual per-customer consumption, which is estimated to be 600 kw.-hr. for refrigerators, 1,375 kw.-hr. for ranges and 3,000 kw.-hr. for water heaters.

In developing lighting business the possibilities are almost unlimited. Lighting consumes one-fourth of our energy sales and supplies 50 to 60 per cent of our revenues. A recent estimate indicates that we have reached only about 13 per cent of the potential lighting market. The total lighting load of the approximately 3,000,000 stores in the United States is only about 3,000,000 kw. A conservative lighting intensity of 10 foot-candles per store would increase this figure to 4,500,000 kw. Our present revenue from this source is approximately $250,000,000 per year; it could be increased by approximately $180,000,000.

Lighting is backward

Recent estimates indicate that with approximately 20,000,000 wired homes in the United States 30 per cent of the population still live in unwired homes. Only half the power requirements in industry are supplied by the power and light companies. The rural market is only 10 per cent developed. Less than 2 per cent of the total railroad track mileage is electrified.

Holding Company Regulation Is Unjustified, Says Mr. Insull

If one adds the total issue of the securities of an operating company to that of the holding company that controls it, one would arrive at a figure much larger than the aggregate securities of the two in the hands of the public. From this it might be assumed that rates for service would have to be such as to earn a return upon the total issue of securities of both corporations. However, by eliminating the amount of securities of the operating company in the treasury of the holding company, it will be found in most cases that the aggregate amount of securities of both corporations in the hands of the public is probably less than the total securities issued by the operating company alone. This being so, the rates would only have to be enough to earn a return upon an amount of securities equal or less than those issued by the operating company to whom the rates are paid.

As a matter of fact, we know that rates are not based on securities issued but on the fair value of the property used and useful in the public service. We think the public knows this; but we are wrong. How can we expect the man on the street to know these things when outstanding political leaders, judging by what they say or write, do not know them? I quote from an article by Governor Roosevelt of New York in last December's issue of *The Forum:*

"It is also a fact that the capitalization of those holding companies and of their subsidiaries and component parts is many times the amount of money which the property owned by them represents in actual outlay or in fair valuation of the property. Let that fact sink in."

Further he says:

"No one questions the assertion that because electricity can be transmitted over great distances, the consolidation of management ought, in principle, to result in greater business efficiency and in a lower actual cost of production. But if we accept either the capitalization of these great holding companies or the market value of their securities, it is perfectly obvious that they expect to earn infinitely larger profits than the historic and sound theory of a reasonable return would permit."

And later he adds:

"The present trend, caused principally by a lack of public interest and understanding, is to permit the consumers to pay the dividends on vast increases of stock issues resulting from mergers and from the creation of holding companies."

What are we as an industry doing to controvert this kind of misinformation? What is this association doing? Those are questions to which we can well afford to devote our time and thought.

The income of the investment or holding companies comes from earnings on securities owned; that which they may receive as bankers, or as experts for services rendered in utility and other fields. Charges of holding companies to their subsidiaries for expert services have been the subject of criticism where they are made on the

basis of a percentage of gross income and of total construction. If these charges have been above the market cost of such services the criticism is justified.

I see no reason why there should not be a complete understanding between the operating companies and the regulating commissions in regard to holding company charges. Such charges should certainly not be greater than would be the market price for similar services rendered by outside expert firms that could render a service equal to that rendered by holding companies to their subsidiaries. It must, however, be acknowledged that the experts of the holding companies, constantly dealing with utility problems and having utility experience covering wide fields, have a better knowledge of the subject than independent experts.

Some people take the position that regulation has broken down and have suggested changes in the regulatory laws which they think would make regulation more effective. One of these suggestions is that the holding companies should be brought under regulation. The legal aspects of this proposal I shall not discuss, although it is pertinent to question the legality of attempting to regulate the holding company whose business is not directly affected with a public interest. As to regulation having broken down, the facts of the case seem strongly to indicate that, on the contrary, regulation has been beneficial to the consumer, to the investor and to the industry. Even its critics must recognize that under state regulation our industry is constantly growing, that it has the financial stability to attract from the investor the necessary new money for a reasonable return in interest or dividends with which to improve its service facilities to meet the constantly increasing public demand at continuously diminishing rates for its service.

As to the regulation of the holding companies, this suggestion is based upon the erroneous impression that holding companies affect the rates the public pays for service. It is questionable if this impression exists to any great extent among the consuming public; it seems rather to exist principally among self-appointed protectors of the public, who in many cases assume that position as a possible steppingstone to their own personal ends. As I have already shown, there is no connection between the security issues of an investment or holding company and the rates for service of its subsidiary operating companies.

The holding company or utilities investment company requires, for the successful performance of its function, the same freedom of action as any other business. It is that freedom that has enabled it to do the great work it has done in the development of the electric industry in this country to a pre-eminent position in the whole world. Without it, that development would not have taken place and future development will be materially retarded.

It should be and it is the ambition of all farsighted utility operators to furnish the best service possible at the lowest rate they can, consistent with such a credit standing of their companies as will attract for reasonable returns the necessary new money to provide increased service facilities to meet the public demand. That, in a few words, is the utility operator's job, be he the executive of the operating company or of the holding or investment company that controls it. The ability of the latter to help in the job depends largely on the holding company's ability to act without restriction beyond the usual restrictions of any well-managed private business.

In many ways the freedom of action of the holding companies has made electricity cheaper and more widely available. To the credit of the holding companies is the passing of the small town plant, and its replacement by the present operating units furnishing the same class of electric service to town, hamlet, and countryside as that given in metropolitan areas, and—considering the difference in density of population served—at comparable rates.

It is hardly possible that all this could have happened had the holding companies been under regulation, even if such regulation were legal. Vision, financial courage and willingness to assume risks and responsibility have made these things possible. These attributes are not necessarily involved in regulation. The everyday risk and responsibility assumed by the holding companies arise out of the fact that their investment is largely in equities, which carry the greatest risk of the business. Anything that tends to reduce earnings affects them first. The securities of the operating companies that the holding companies hold are made good last. It is the geographical and industrial diversification of the operating companies in which the holding companies' major investments are made that spread this risk so as to make it possible for holding companies to assume it.

Extensions of service, reductions of rates and increases in consumption are the very life of this industry, and the keynote of its growing usefulness to the nation. They are all made possible by the assumption of risks and responsibility by the owners of the operating companies' common stocks.

Thus no element is more important to the progress of the industry than the character of the common stock ownership. The attitude of the holders of the common stock determines whether the operating company shall pursue a progressive course or simply stand still and "let well enough alone." Suppose the common stock of these operating companies were owned by individual investors—the people who generally own the bonds or preferred stocks. Either they would not meet such investors' requirements, or else a policy of caution would be applied to them and the extension of the service and reduction of rates would be retarded. The individual investor is, of necessity, dividend-conscious. He is in the business primarily for a safe and steady income, and wants this assured. He is not versed in the utility business. Contrast this with the ownership of the common stock by an organization trained and experienced in the utility business, an organization which can take risks because of its diversified investments and its experience in having met similar conditions before; which knows what it is doing and where it is going. Since the owners of the common stock take the risks involved in the progressiveness of the operating companies, it is greatly to the interest of the consumer that the common stock ownership rest with such agencies as holding companies.

The incentive to take these forward steps must be kept alive. Freedom of action and the privilege of risking a loss as well as making a profitable investment is necessary as a motive force. Neither will long exist under a restrictive regulation.

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8. **L. B. Herrington** East Central
9. **C. H. Hodskinson** New England
10. **T. H. Tutwiler** Southeastern
11. **Fred W. Insull** Southwestern
12. **G. C. Neff** Great Lakes

Cheap Steam Power Checks Hydro Expansion

By A. H. MARKWART
Vice-President Pacific Gas & Electric Company

AS A RESULT of the change in the economic relation of steam and water power in favor of steam, steam plants are now being installed in California along lines of most advanced practice for the purpose of meeting growth in load, and with the presence of cheap fuel, in the form of oil and natural gas, it appears that steam-electric installations will predominate for some time to come.

At the outset of power development in California water power became the basic energy supply because the thermal efficiency of steam plants was low and the price of fuel relatively high. Later on public interest demanded curtailment of the use of fuel oil as a conservation measure; consequently the conversion into electricity of the power existing in the ever-falling waters of the many mountain streams continued as it had begun. Now, however, there are going to waste in the state enormous quantities of natural gas which cannot be conserved, but much of it can be put to beneficial use if the power industry will hold its major potential water powers for future development, as far as this is possible, in order to take advantage of the economic benefits which will accrue to it and the general public through the use of an ideal fuel actively seeking a market.

Now, by reason of the cheapness of steam-electric power few hydro-electric projects are economically justifiable. The art of fuel power generation has made a very great advance, particularly with respect to thermal efficiency. Moreover, development costs of modern steam plants have been fully absorbed and their high-pressure boiler and turbine equipment is on a production basis, which makes possible a lower capital investment than heretofore was necessary; likewise, maintenance and operating costs have been reduced, and fuel in various forms is cheap.

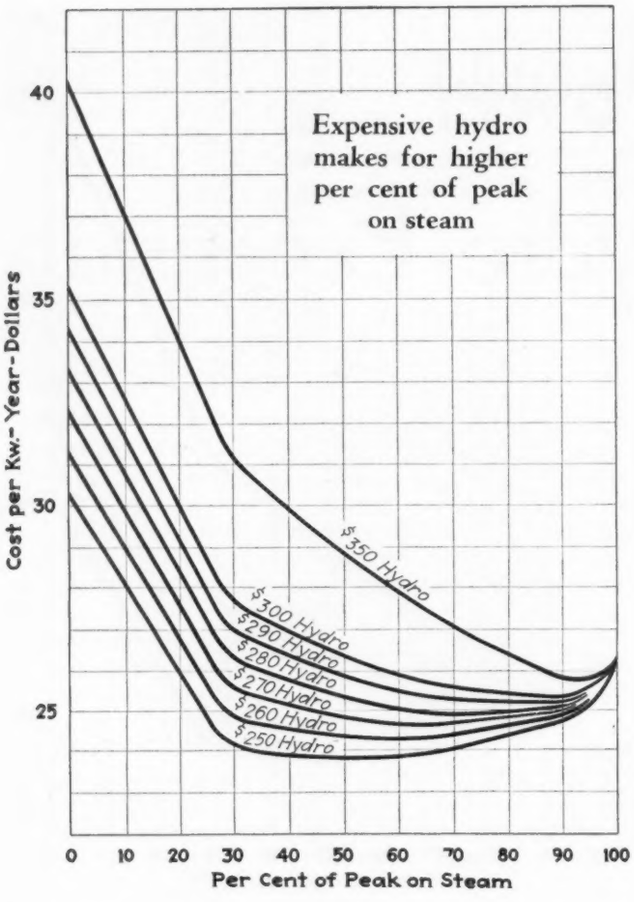
Under circumstances which now prevail, it is natural to question the future of hydro power in California despite the fact that hydro development has been actively prosecuted advantageously for more than four decades.

At the present time the power supply of California is on the basis of approximately 65 per cent hydro and 35 per cent steam, which indicates that, despite the popularity of hydro, the advantage of having steam plants to carry the peak of a system that is basically hydro and to act as a reserve has been fully recognized. Experience has indicated that, for a load factor of the order of 60 per cent, composite economy in power production will be had if the load be divided into two parts and the bottom or high-load-factor portion of the load placed on hydro and the top or low-load-factor portion of the load placed on steam. The proportion of hydro to steam varied from time to time, depending upon the capital cost of hydro and the price of fuel.

Hydro more expensive, steam less

The present trend of water-power development costs is upward, because as a general thing the remaining sites cost more to develop and are less accessible than those sites which have already been developed. Moreover, the past ten years, for the most part, have been subnormal or very dry, and as a result the output from existing plants has been reduced. Consequently engineers are constrained to establish for new developments a lower average annual output than they otherwise would have established without a knowledge of the effect of the dry cycle. And, too, reduction in investment and operating costs of hydro does not appear probable and it is likely that the efficiencies can be improved very little. Maintenance and depreciation costs can be reduced, but only at the expense of increased capital and corresponding increased interest charges.

On the other hand, during the last ten years the fuel economy of steam plants when operating at high load factors has increased from about 250 kw.-hr. per barrel,



representing a thermal efficiency of about 13½ per cent, to 480 kw.-hr. per barrel, representing a thermal efficiency of about 26 per cent, and now, with the installation of very high-pressure, high-temperature units to operate on reheat cycle, it is confidently expected that the fuel economy will be about 510 kw.-hr. per barrel, representing an efficiency of 28 per cent. While this improvement in thermal efficiency of steam plants was appreciated in California, no advantage was taken of it until about 1928, when some fairly high-economy steam installations were made in southern California.

Influence of the price of oil

Certain studies, to support the reasoning adopted in the present instance, were made to determine the place of hydro in a 60-per-cent-load-factor system load with oil producing 510 kw.-hr. per barrel, priced at 75 cents and $1 per barrel, and with hydro at capital costs of $250 to $350 per kilowatt of delivered peak. The curves indicate that 35 per cent of steam on an output capability basis which now obtains in the state is too low for new installations to meet growth of load at best economy.

By reference to the curves for oil at 75 cents per barrel it will be seen that with hydro which has a capital cost of $290 and above per kilowatt at load centers energy is had at the lowest cost when 90 per cent of the system load is carried by steam. As the capital cost of hydro falls below $290 per kilowatt the percentage of hydro which may be employed in order to obtain energy at the lowest cost is greater, being about 50 per cent when the capital cost of hydro is $250 per kilowatt. However, if the cost of energy from all steam, rather than the least cost of energy, is made the criterion, it would be possible to carry as much as 47 per cent of the load on $300 hydro and have the cost of the mingled energy no greater than that which would obtain with 100 per cent steam. For $280 hydro a similar situation would obtain with 70 per cent hydro, which would be the practical limit for hydro, since at least 30 per cent of the peak in steam is necessary in California to take care of the dry-year hydro energy deficiency.

While this curve indicates that with $300 hydro combined steam and hydro would furnish power at the least cost when the hydro carries only 10 per cent of the load, such a combination of steam and hydro would be illogical because of the large amount of peak that would have to be added to a system in order to employ a hydro source of a given size. Thus a 100,000-kw. hydro development, if it were to represent but 10 per cent of the peak, would require a total load of 1,000,000 kw. when taking its place with steam to meet such a growth in system peak on a purely economic basis. In practice the thing to do would be to carry the growth of load with 100 per cent steam, or with 55 per cent steam and 45 per cent hydro, at a cost of some 5 per cent more than the theoretical least cost which could be obtained with combined hydro and steam.

When it is considered that very little hydro is available at a capital cost of less than $300 per kilowatt at load centers, that low fuel prices are likely to prevail for several years, and that hydro is now carrying the larger part of the total load of the state, it is probable that the growth in load for the next few years will be carried by fuel plants, located at load centers, particularly where steam-generated energy in excess of the needs there can be spilled into the outlying territory over existing incoming hydro transmission lines.

Natural gas going to waste

While the future of hydro is the subject of this discussion, it must be remembered that 250,000,000,000 cu.ft. of natural gas was wasted in 1929. This waste is being continued, since the major gas-producing fields wasted 22,500,000,000 cu.ft. in January, 1930, and probably considerably more in the months which followed. If the 1929 wastage had been burned under steam boilers for electric generation it would have produced 22,000,000,000 kw.-hr., an amount of energy equal to the requirement of the state twenty years hence. As only slightly more than 9,000,000,000 kw.-hr. was produced in California in 1929, it appears that all requirements of energy for the entire state could be answered through a conversion of the potential quantities of natural gas in its fields with much to spare. In the face of this wasting asset, it is difficult to predict the future of hydro.

A factor which leads one further toward the conclusion that the power companies are headed toward 100 per cent steam for their added necessities for a time is that on most California streams a full development of the stream is necessary in order that the cost of storage, which is usually high, may be a charge against all of the power from a comprehensive development of the power stretch of a stream instead of against the power of any single project on the stream.

Steam plants must be constructed to carry the load until the growth is sufficient to absorb the output of relatively large hydro developments. On the assumption

that a large hydro development can be accomplished in three years, at least two years of growth must be carried on steam. It may be that fuel will be high three to five years hence, and some will gamble that it will be and proceed with hydro construction on the theory that it will be justified, when completed, by the capitalized value of the then fuel cost saving of the fuel not burned. On the other hand, others will believe that we are entering into what will be a long period of low-priced fuel, in which event it will be difficult to justify the building of any but the most favorable hydro projects.

It is apparent that the whole economic trend is toward 100 per cent steam for new installations, unless some very favorable hydro presents itself.

This is not intended to mean that hydro cannot be developed at the present time. It can be, on the basis of carrying a greater percentage of the load than, say, 10 per cent, provided the waste of natural gas be ignored and provided, further, that all that is desired is to limit the cost of mingled power to that of power from a 100 per cent steam development.

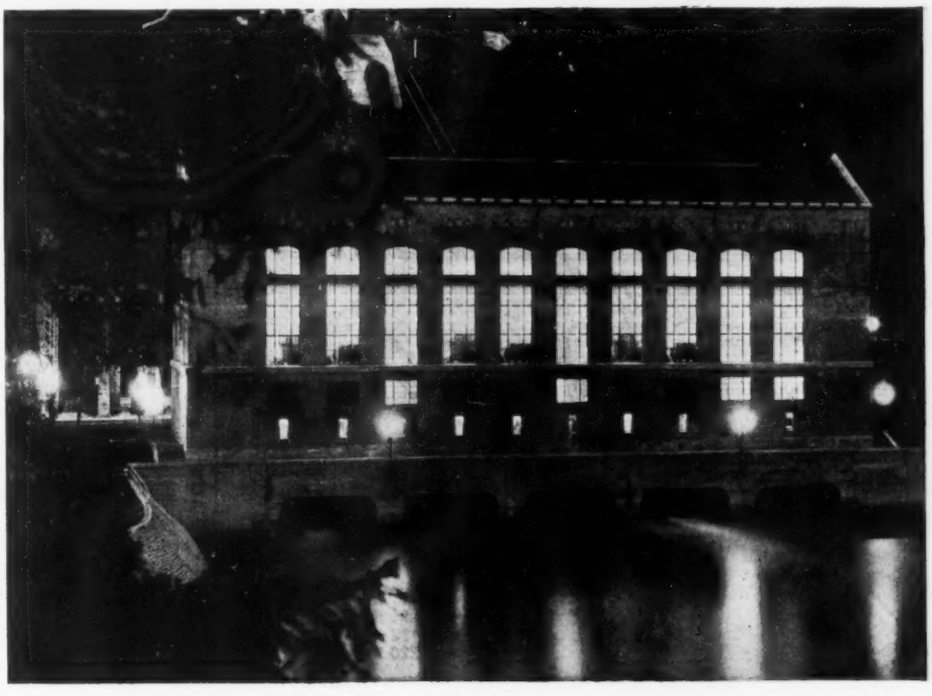
It would appear that an installed capacity in the future, divided about 60 per cent to steam and 40 per cent to hydro, is desirable, as roughly indicated by the chart showing annual cost of energy under different conditions, if the fact be overlooked that the chart has been prepared on the basis of delivered rather than switchboard peak and that the annual costs, owing to higher operation, maintenance and depreciation expenses, of existing hydro and steam are greater than those assumed in the charts for future hydro and steam. If these factors had been taken into consideration, it is probable that the proportion of steam and hydro would change very little.

It is certain that the price that can be paid for hydro power will be determined by the cost of equivalent power from the most economic steam plants, which at present are those designed for 1,200-lb. steam pressure, with reheating, three or four-stage extraction, an initial steam temperature of 750 deg. F., an exhaust of 29 in. of vacuum and with a reheat temperature of 750 deg. It appears that 1,400-lb. boiler and 1,200-lb. turbo-generating equipment, as now fully developed by the manufacturers, costs very little, if any, more per kilowatt of capacity than the 400-lb. equipment of the recent past.

We are now approaching a thermal efficiency of 30 per cent. An increase to 40 per cent will reduce fuel one-third and bring the fuel consumption to a rate of 8,500 B.t.u. per kilowatt-hour and raise the economy to 735 kw.-hr. per barrel. It does not require much stretch of the imagination to see what the effect would be upon hydro development if this fuel economy was attained, or if it was materially increased over the 510 kw.-hr. per barrel which was used for the purpose of this discussion.

So, in conclusion, it safely may be asserted that the future of hydro in California is largely dependent on the price of fuel, and this in turn upon that measure of control which is exercised respecting overproduction of fuel. Hydro construction has fallen off and doubtless will not be resumed in the near future except for certain projects which for one appealing reason or another require immediate attention.

If fuel prices continue to decline, steam installations safely can be made until the major portion of the system load growth for a period is carried on steam, looking to a total capacity divided about evenly between hydro and steam. If fuel prices rise materially, hydro may be built, provided that it has its complements of steam in order to place the hydro, which in general will be relatively high in capital cost, on a high load factor, so that it can produce its complement of energy at a low unit cost.

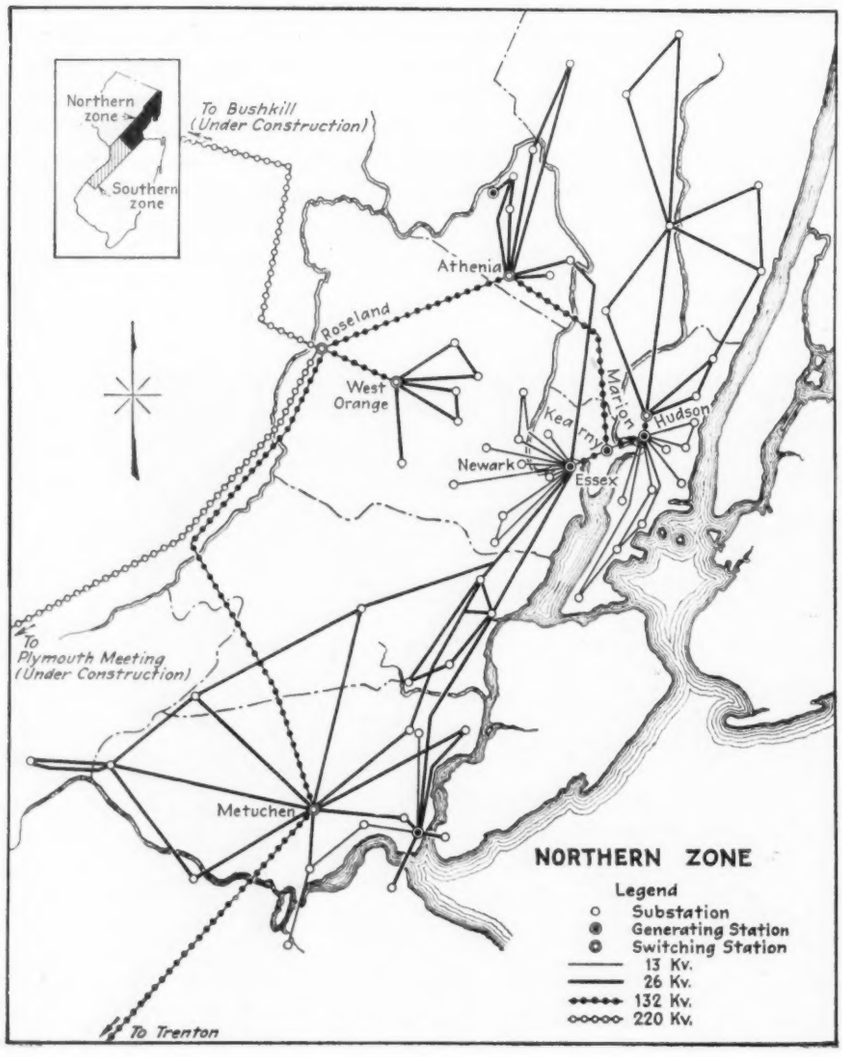


Pit No. 3, a 108,600-hp. hydro station of Pacific Gas & Electric Company

COFFIN AWARD

to Public Service

FOR outstanding achievement in creating a system comprehensive enough to meet present conditions, elastic enough to care for the future, adequate enough to assure high service reliability, economical enough to provide such service under rate schedules that stimulate use and provide reasonable and fair charges to all classes of customers—operated with full recognition of obligations to public, employees and stockholders.



Commercial Achievements

Total energy sold, 1,647,000,000 kw.-hr.; increased 17 per cent over 1928; total industrial sales, 1,062,000,000 kw.-hr. (20.3 per cent increase).

Industrial load factor increased from 43 to 47 per cent since 1925.

Low inducement rates for greater use of demand and off-peak power for large-consumption customers.

Commercial revenue increased $1,085,747 in 1929 by store and window, industrial and sign lighting.

Street lighting revenue increased 63 per cent in five years.

Operating Economies

Concentrated production in more efficient plants: Kearny and Essex now producing 91.3 per cent of output, whereas Marion, Burlington and others produce only 8.7 per cent, compared with 35 per cent in 1925.

System B.t.u. per kilowatt-hour, 18,758; reduced 4.6 per cent since 1928; Kearny develops 1 kw.-hr./16,650 B.t.u., an improvement of 2.5 per cent; load factor raised 21 per cent.

Unit cost of generation — 5.02 mills/kilowatt-hour (2.6 mills less than 1925); producing 4,509 kw.-hr. per employee, or nearly twice that in 1925.

Despite 13.6 per cent increase in output, total cost of energy is 0.8 per cent less, due to decreased coal rate, coal price, cost of transportation and ash removal, economies from tie lines, and more efficient operation.

Electric & Gas Company of New Jersey

FOR DISTINGUISHED CONTRIBUTION
TO THE DEVELOPMENT OF ELECTRIC
LIGHT AND POWER FOR THE CONVEN-
IENCE OF THE PUBLIC AND THE
BENEFIT OF THE INDUSTRY
AWARDED TO
PUBLIC SERVICE ELECTRIC AND GAS COMPANY
1929

General

Improved public relations; only one complaint per 11,000 meters; avoided radio interference; improved street construction; expedited service connections; executive analysis of customer criticisms.

Co-operation with dealers and contractors in promotion and selling; does not undersell.

Serves 56 per cent of farms; increased 9.6 per cent in year; increased use per customer 15 per cent to 932 kw.-hr.

Uniform rates throughout territory for each class of service.

Service Reliability

Relay operation 92 per cent correct in 1929, compared with 70 per cent in 1925.

Twenty lightning recording stations and twelve forest fire lookouts determine paths, duration and intensity of storms.

Modified or replaced circuit breakers extensively.

Supervisory control for six substations totaling 93,000 kva.; 9,679 operations without failure; automatic transfer of load in twelve installations.

Sectionalized distribution lines and provided convenient tie-in points.

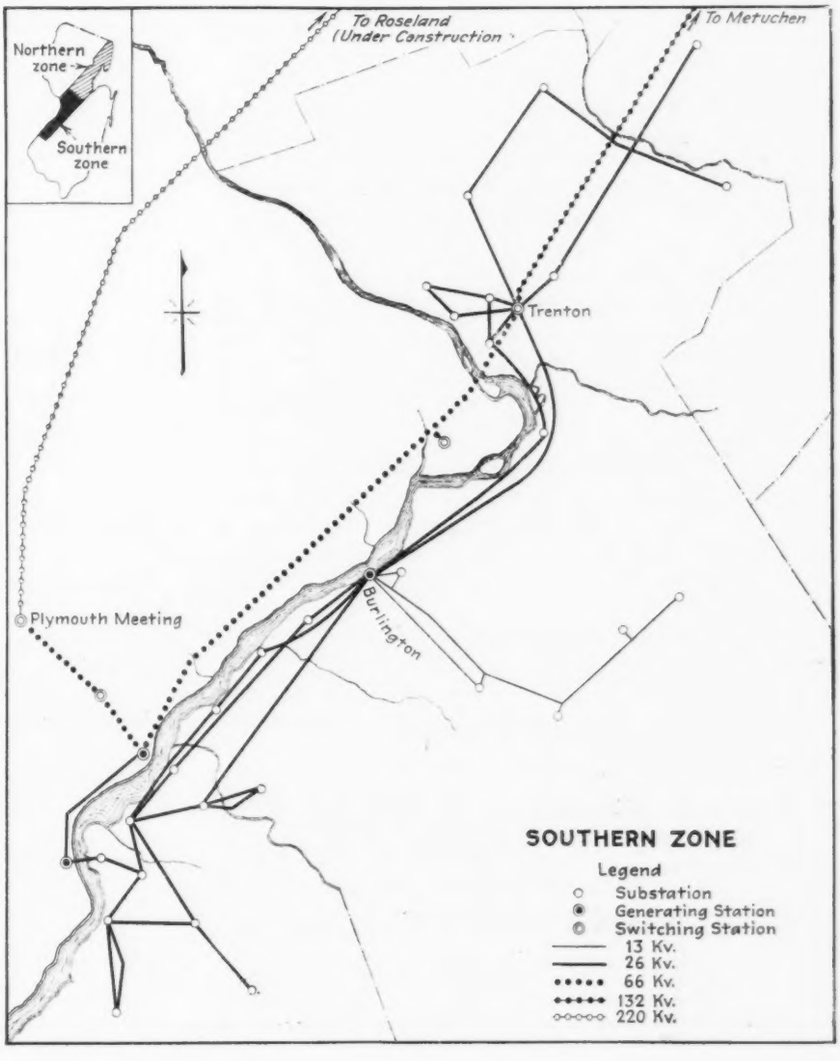
Two-way feed to transmission substations; no more than two circuits on a pole; no more than four substations on same transmission loop.

System Planning

132-kv. ring with switching stations feeding load-center substations and interconnections with adjacent companies (Philadelphia Electric, Pennsylvania Power & Light, New Jersey Power & Light, American Gas & Electric, and Staten Island Edison Companies) provide for future.

Tie between northern and southern zones strengthens service in latter, permits interchange of power, transfers load to more efficient stations, allows receipt of economy and dump power.

1924 prediction of 1929 peak within less than one-half of 1 per cent correct.



Prizes Awarded

at San Francisco Convention, N.E.L.A.

INSULL PRIZE—A cash award of $250, donated by Martin J. Insull for the best paper dealing with public relations in the electric light and power industry.

Rob Roy MacLeod

Buffalo, Niagara & Eastern Power Corporation, Buffalo, N. Y.

"Concerning Pens and Swords"

McGRAW PRIZES—Cash awards of $250, $150 and $100, donated by James H. McGraw for the three best papers on any engineering or technical subject relating to the electric light and power industry.

1. C. F. Mowrey

Syracuse Lighting Company, Syracuse, N. Y.

"Heating by the Refrigerating Cycle"

2. C. L. Avery

New York Power & Light Corporation, Albany, N. Y.

"Model Testing—a Phase of Design"

3. E. B. Strowger

Niagara Falls Power Company, Buffalo, N. Y.

"Increased Kilowatt-Hour Output of Hydro-Electric Plants by Reducing Turbine Gate Leakage"

FEDERAL PRIZE—Award of a gold medal and $1,000 in cash donated by the Federal Electric Company, Chicago, Ill. The gold medal is awarded to the company making the greatest contribution in electrical advertising, and the cash award goes to the individual in that company responsible for the achievement. Medal awarded to

Brooklyn Edison Company

Cash awarded to

H. H. Balkin

on behalf of himself and associates

BONBRIGHT PRIZE—An award of $10,000 to the person who in 1925 best predicted conditions in the electrical industry as they exist now.

Reuben B. Sleight

COFFIN AWARD—For outstanding achievement in improving relations with public, technical developments, commercial growth, physical facilities, etc.

Public Service Electric & Gas Company

Newark, N. J.

DAVIDSON PRIZES—Cash awards of $250, $150 and $100, donated by James E. Davidson for the three best papers dealing with commercial or merchandising problems of the industry.

1. H. Zinder

Commonwealth Edison Company, Chicago, Ill.

"Competition and Merchandising"

2. Bayard W. Robertson

Edison Electric Illuminating Company of Boston, Boston, Mass.

"Effective Trade Relations Between the Electrical Contractor and Central Station"

3. William Bliss Harris

Pennsylvania Power & Light Company, Williamsport, Pa.

"Let's Sell the Idea"

DOHERTY PRIZE—A gold medal donated by Henry L. Doherty for the best paper on any subject pertaining to the electric light and power industry.

H. G. Dooley

Florida Power & Light Company, Miami, Fla.

"The Neighborhood Electric Company"

BYLLESBY PRIZES—Cash awards of $250, $150 and $100, donated by H. M. Byllesby & Company, in memory of Col. H. M. Byllesby for the three best papers showing how to increase the usefulness of the accountant in the public utility industry.

1. James H. Clawson

Stone & Webster Service Corporation, Seattle, Wash.

"How the Accountant Can Make Himself Useful to the Management"

2. Herman L. Gruehn

United Gas Improvement Company, Philadelphia, Pa.

"The Significance of Price Economics to the Utility Accountant"

3. Paul R. Enright

Wisconsin Public Service Corporation, Oshkosh, Wis.

"Measuring the Usefulness of the Accountant"

What Does Future Hold?

By W. A. JONES

Vice-President N.E.L.A.

IT IS too much to assume that we may expect any such improvements in the efficiencies of electrical equipment as we have seen in recent years, but the research engineers who are willing "to lift the corner of the curtain of their hopes" promise us some important developments for future years. Exhaustive research has been under way for some time on very high-pressure turbines and on the two-fluid vapor cycle, generally known as the mercury turbine and boiler, and enough has been accomplished already to justify the research engineers in assuring us that the future will see many installations of this type of equipment with greater and greater efficiencies. Other research engineers are conducting outstanding experiments in the field of high-voltage transmission. Within the year rapid strides have been made in the design of lightning-proof lines and apparatus. From this new knowledge lines and apparatus in the future can be made lightning-proof and free from lightning disturbances and outages.

Perhaps of even greater importance to the industry is the research now going on in the perfection of the vacuum tube, which seems destined to play a large part in high-voltage transmission in the future. With the new vacuum tube in sight, many of our transmission and distribution problems will be simplified, for it has been demonstrated that the tube can turn alternating current into direct current as well as direct current into alternating current.

It is impossible to predict with any degree of satisfaction what the research efforts of the next decade will mean in our business, but of this we may be certain—we can look into the future with a feeling of confidence that our business will not become stagnant or static, when we realize that millions of dollars are being spent annually by the manufacturers in research and development and hundreds of men are devoting all of their time to the discovery of new methods, devices and equipment which will decrease the cost of our service to the public and insure its more universal use.

Rate trends are favorable

Indications are that we should be able to reduce even further the cost and rates for electric service, but these further reductions, particularly in the domestic field, must come largely through increased sales. Our increased sales will likewise be largely dependent upon the design of rational promotional rates, which will encourage the maximum use of energy on a load factor which will make for lower service costs.

There is still a wide divergence of opinion within this industry as to the proper method of charging for service, and a casual examination of our rate book might indicate to the layman that each company was trying to outdo the other in a rate innovation. We within the industry know that this is not the case, and that in many instances political influences and arbitrary regulatory bodies have interfered with the promulgation of rational rates. But we have been slow to recognize that this dissimilarity in rate structure has been the cause of much criticism on the part of those who wanted to find some vulnerable spot in our armor.

The conditions under which our service is sold throughout the country are such that the time will perhaps never come when we shall see a uniform rate, but there is no good reason why our methods of charging for service should not be uniform. It is to be hoped that the rate structure committee of this association will have the full co-operation of the membership in its problem of designing methods of charging for service which will at once protect our investment against the convenience user who does not pay his share of the cost and also permit intensive commercial development.

Potential markets beckon

The diligence with which the light and power companies have developed business in recent years has been commendable, but, viewed as a whole, the industry has not excelled in commercial development and has been outstripped by many other newer and less essential industries in this country.

Of the popular domestic appliances, the refrigerator and the range offer the two greatest commercial possibilities. The electric refrigerator, with an approximate consumption of 725 kw.-hr. yearly at the average rate

for domestic service, should add approximately $45 per year of revenue for each installation, and where special promotional rates have been made this should result in doubling the annual revenue from the home. The next ten years should see the production and sale of at least 1,000,000 units per year, with an annual potential revenue of at least $200,000,000 from this one appliance alone.

The electric range has a more limited market and meets a keener competition in efficient gas appliances, but, with our method of living, drifting from the home to the apartment house, there is a popular demand for the electric range. We may conservatively estimate that in the next ten years we should reach a saturation point of 25 per cent in this appliance, which should result in potential annual sales of 7,500,000,000 kw.-hr. and annual revenues of at least $200,000,000.

In the field of railway electrification we find that of the 250,000 miles of steam railroad, only about 1 per cent has been electrified. Important trunk line systems are turning to electrification as a solution of their problem of traffic congestion and where it is necessary to speed up freight and passenger movement. The electrification of our great railway systems involves many intricate problems in engineering and finance. The railways must have dependable sources of supply, so that their service may not be impaired. The rapid interconnection of our large power systems is hastening the day when this question of service will be answered to the satisfaction of the railway engineers. Second only to the matter of adequate and reliable service facilities comes the matter of proper rates, which, among other things, must provide for the displacement of the existing steam facilities.

The possibilities of electric heating in our industry have never been exploited to any extent. Here again we meet the keenest competition in oil, manufactured and natural gas, but in many heat treatments electricity is so far superior to any competitor that we find the greatest potentialities in this market. Some idea of the amount of load to be added from this source may be had when we realize that in the Schenectady plant of the General Electric Company the total kilowatt-hours used in electric heating equals the amount required to drive all the motors in the factory. To quote from a recent statement of a director of research activities there, we find:

"Almost every improvement that has been in our materials and processes may be traced to some form of electric heat in melting, enameling, brazing or heat-treating furnaces, and particularly all of our new instruments make use of electric welding or weld with atomic hydro-

What Some People Would Have Us Believe

These criticisms are unfounded. Many of them are based on misinformation. Still others are misstatements by those who have selfish interests at stake. But, in the face of these charges and criticisms, we dare not enter a plea of *nolo contendere*, for to do so is to admit guilt.
It is therefore the obligation of this industry to answer these criticisms completely and specifically. If we fail to do so, a public sentiment will grow up which will undermine the foundation stone on which we hope to build in future years.

W. A. JONES, *Vice-President N.E.L.A.*

1. Commission investigations indicate that the utilities have been guilty of mismanagement and dishonesty.

2. Investigations prove that state regulation has failed and some radical new system should be adopted.

3. Government ownership is a cure for the shortcomings of private ownership.

4. Government ownership is superior in point of cost and in other important respects to private ownership, however honest or efficient the latter may be.

5. Because the utilities maintain an elaborate propaganda system, they must be trying to cover up a lot of dishonest acts.

6. Utility propaganda has been misleading and untruthful and has corrupted high school and college students and the public generally.

7. Electric rates could and should be lower because of the large sums made in utility common stocks.

8. Rates are based on capitalization, most utilities have watered stock and therefore rates are too high.

9. The utilities wish to keep their rates as high as possible as long as possible, in order to swell their profits.

10. The utilities never make rate reductions nor service improvements unless they are compelled to do so by the state commissions or the courts, and even then they resist to the last ditch.

11. The utilities fight state regulation and do everything they can to frustrate its effectiveness, by court appeals and otherwise.

12. The utilities make a much greater margin of profit than private and unregulated industries.

13. Mergers among utilities are for the sole or principal purpose of making greater profits from the public.

14. The utilities are guilty of dishonest and unfair valuation systems in order to escape taxes, make greater profits and keep rates high.

15. The utilities are exploiting our natural resources in order to increase their already exorbitant profits.

16. The utilities spend vast sums bribing legislatures, city councils, state commissions and influential politicians in order to increase their power and swell their profits.

17. Holding companies are maintained for the sole or principal purpose of securing the cream of the profits made by operating companies.

18. There is a tremendous "power trust" (commonly visualized as a fat man wearing a suit of greenbacks), which trust is the enemy of the people.

19. All of the industry's critics are disinterested, unselfish and are all fighting the people's battle against the corrupt "power trust."

20. The utilities are aggressively dishonest and the radical campaign and other attacks are simply defensive measures to protect the public.

gen. The General Electric refrigerator in its present form could not have been built without the use of electric heat, either in the form of welding or brazing furnaces. The extensive use we make of electrical heat will soon be followed in many other industries."

All of the foregoing potential markets, both in the domestic and power fields, have long since passed out of the experimental stage and by hundreds of applications have satisfied the most skeptical that the business may be connected to our lines if we are willing to develop.

It cannot, however, be said that any considerable portion of this business will come on our lines without the use of active and intensive sales effort. It is a notorious fact that for years many of us in the light and power field labored under a misconception which dulled our commercial instinct. We were disposed to assume that the public would buy our service because it was preeminently the most satisfactory form of light and power. We should not be proud of the fact, but, if we are honest with ourselves, we must admit that much of the profitable business now on our lines came to us without any effort on our part. In the future this industry must till the market soil more diligently and fertilize the ground with salesmanship and sales engineering to an extent never before seen in our business.

The trend of regulation

In the power field we met and still meet the keenest competition from powdered coal, low-priced oil and highly efficient oil engines, as well as both manufactured and natural gas, with excellent utilization equipment. At no time in our history has the competition in the power field been more keen than at the present time, and with the rapid development of the natural-gas industry which we have seen in the past three years, we know this competition will be even keener in the future than it has been in the past.

If there ever was a time when the light and power companies tried to maintain their rates at abnormally high levels, that time has long since passed. Despite opinion to the contrary, electric companies everywhere are striving to sell their products at the lowest rates consistent with adequate service. With these conditions prevailing, there should be less clamor in the future for stringent laws, which often hinder and seldom help the development of any business.

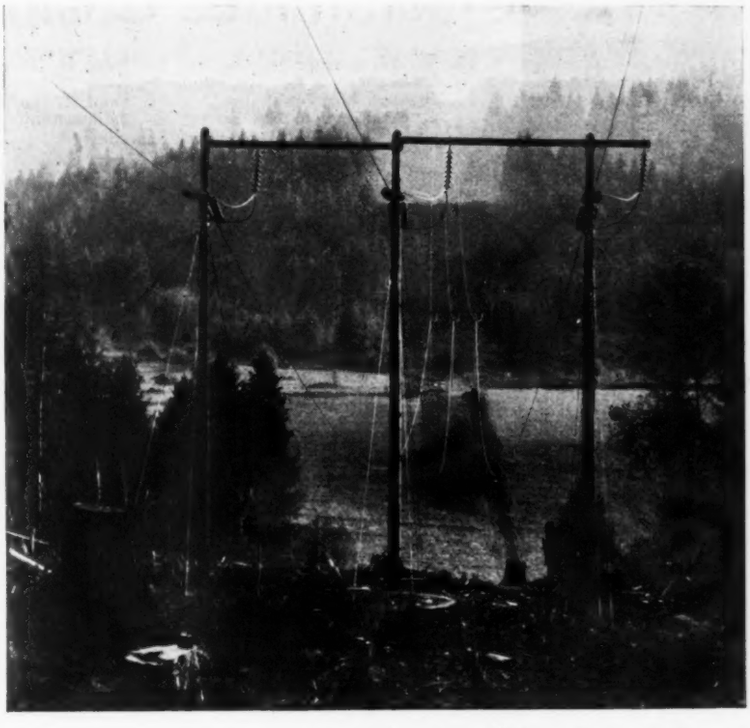
We have ample evidence, however, that some portion of the public we serve, some sincere public officials and many politicians believe that regulation has failed and that there is need for more stringent laws to protect the public interest. There is now in progress a searching investigation by an arm of the federal government to determine if there be need for some form of federal control of our business. Those who know our business best believe that, on balance, the record of this industry for service to the public stands out as unparalleled in the history of American industry. None could contend that in an industry as large as this there have been no cases of mismanagement, no mistakes of judgment and no errors in matters of public policy. On the contrary, we know that there have been cases of mismanagement. The industry has not condoned nor does it now defend these mistakes. Drastic action has been taken by state commissions to punish the offenders over and over again, and in many instances public opinion itself has applied the chastening rod necessary to rectify errors of judgment which have here and there been in evidence.

It would be a public calamity if reformers or agitators were able through their efforts to throttle or stand in the way of the future development of this great and essential industry.

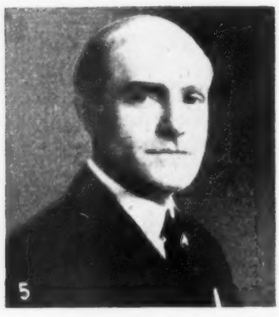
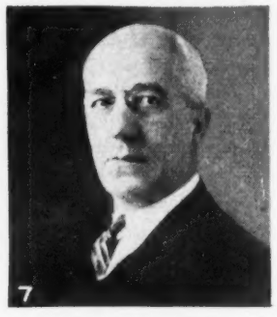
What will be the public attitude?

Our gravest danger lies in lethargy on the part of the public or misinformation disseminated by critics and reformers and misunderstandings which grow out of lack of information.

In recent years many quite new instruments of finance and corporate control have been introduced into our business. Holding companies, sub-holding companies, management corporations, investment trusts, mergers and consolidations, the interconnection of power systems, the passing of the locally owned utility—all of these have come in a never-ending chain to superimpose a maze of added complexity upon a business already little understood by the public. These changes have almost without exception been in the public interest, but they are nevertheless confusing, and unless they are better understood we cannot hope for intelligent and rational regulation in the future.



Wooden-pole construction is popular for service up to 165 kv. in the Pacific Northwest. This line is operated at 110 kv.

Special National Committee Chairmen

1. **M. S. Sloan**
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2. **Irwin W. Day**
   Codes and Standards
3. **E. W. Goldschmidt**
   Exhibition
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5. **Britton I. Budd**
   Electrification of Steam Railroads
6. **L. R. Nash**
   Rate Research
7. **P. S. Arkwright**
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8. **Frank W. Smith**
   Lamp
9. **W. H. Onken, Jr.**
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13. **Eugene Holcomb**
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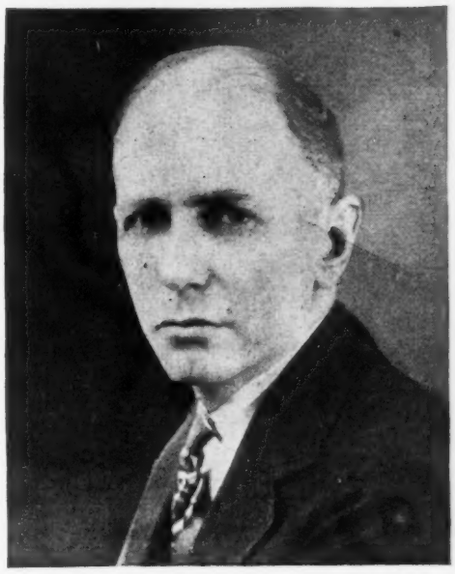
15. **Fred R. Jenkins**
    Educational
16. **A. Jackson Marshall**
    Membership

Research Motivates Engineering Activities

By ALEX D. BAILEY

Chairman Engineering National Section



IN OUR industry, where ordinarily the cost of the plant, invested capital, bears such a large ratio to the income, it is particularly important that the engineer consider dollar efficiency. No engineering problem, no matter how technical, is completely solved until the answer has been worked out in dollars and cents, and in this all items involved must be considered. At this time more than ever before, technical efficiency is not the final answer, and the engineers who are planning, constructing and operating our properties must take a wider view. Our industry is demanding new money at a continually increasing rate, and by forecasting the future from accomplishments of the past it is evident that within another generation the amount of money required annually will be stupendous if our industry continues growing as it has in the past and unless we greatly reduce our unit investment costs.

Co-ordinated research essential

The engineering research committee, organized during the past year, has made a good start in the co-ordination of the research work of the industry. The research activities originated by the various committees are being followed and information is being assembled regarding similar work or other research which is being conducted by member companies, groups of companies, or outside agencies. With this information being continually collected it is planned to have at headquarters a clearing house for research information where member companies and committees may obtain the latest information regarding the progress of pertinent research work and where will be listed all the agencies qualified to conduct research work of any description in which we may be interested.

While it is impossible to estimate accurately the money expended for research annually by our member companies, it is evident that this has reached such proportions that some co-ordinating agency is not only advisable but necessary in order that duplication may be avoided and that information shall be immediately available. There are certain projects of such a general nature that the expense of the research should be borne by the industry as a whole, and this organization is the proper body for instituting and directing such research. It is true that the manufacturers have a certain responsibility in conducting research, and this they are assuming without question, but there are many subjects of an operating and commercial nature in which our member companies are primarily interested and for which they alone have the proper viewpoint and facilities. Research is necessary in any live and prosperous industry if it is to keep up with the times, and the amount spent by the power industry, large as it may seem by itself, is as yet a very small percentage of our annual income.

Research pays dividends

The research work on underground cable has already paid big dividends on the cost of the research in changes in cable construction and operating methods. Generating station equipment continues to increase in the size of the individual unit and in the over-all plant efficiency. Boilers recently installed have delivered 1,000,000 lb. of steam per hour continuously; the 1,200-lb. steam pressure has come to stay and higher pressures are contemplated; steam temperatures have moved up another hundred degrees. These affect operating costs in a favorable direction in all divisions of station operation. Studies of the performance of equipment, both steam and electrical, are being continued and valuable information is obtained for both the manufacturers and the operating companies.

In spite of this work, however, statistics for the past several years show that although the unit investment cost for generating stations is slowly but steadily decreasing, the total station cost is just as slowly and steadily increasing. It is a matter of grave importance.

The Growing Importance of Public Relations

By HARRY REID

Chairman Public Relations National Section

WE FACE two factors—first, the fact that the last few months have witnessed a growing campaign on the subject of utility regulation or control or ownership; second, the general public is not by training and experience qualified to judge for itself just where the real facts of the situation rest. To my mind, the most dangerous of these two factors is the latter. If people in general were capable of judging for themselves, we would not have to be greatly concerned with the widespread campaign now under way, because we would know that people would not be misled, confused or fooled. But such is not the case. It is far from the case. The truth of the matter is that the public thinking regarding the utilities has been widely upset during these last few months. I am afraid that many people have accepted as gospel truth opinions that we know to be untrue.

In this connection a study of the psychology of accusation is most interesting. If the man in the street is today scratching his head and saying to himself, "Good heavens! Can all this be true?" can we really blame him? Relatively and comparatively, the utilities have presented very little of the opposite side of the question. It is human for people to believe that where there is so much smoke there is probably a huge fire burning somewhere in the vicinity, which in this case is in the electric light and power industry. In many political campaigns, for instance, it is an old trick to make a wide variety of charges just on the general principle that these accusations will unsettle public confidence in the person or organization attacked. The value of this subterfuge lies in the fact that people—as the newspaper boys will agree—are more interested in the sensational and the startling than in the prosaic and matter-of-fact, and also that many people are inclined to half believe or sometimes wholly believe accusations without taking the trouble to hear the other side and then try to reach a conclusion.

This human characteristic leads me to the thought that the sin of silence is sometimes a dangerous sin. Now we may all agree that it is unfortunate to be drawn into a defensive position where it becomes necessary to speak out to defend ourselves, but we will also agree that we are sometimes forced to speak out so that the truth may be known. The point is clear-cut: which is the lesser of two evils—to remain silent and allow people to decide against you or to to speak up and state the facts so that you may be fairly and honestly judged?

Aside from the damage done our industry by a policy of silence in the face of widespread attacks, there is the fact that by maintaining silence we are in effect allowing our critics to tell the public the story of our industry distorted to fit their purposes and desires. That is, the public is hearing a misleading story, and it is more than likely misjudging our industry because of that misleading story. How could it do otherwise unless our industry and its leading executives and companies step forth and place the real facts before the public?

Why let the critics alone speak?

Why should we allow our enemies to tell our story? Why shouldn't we tell our story ourselves? Who has a better right to tell it? It is fundamental that we have the good will of the public—that we have good public relations. How can we hope for this condition if we say in effect to our enemies and critics: "Go ahead and tell our story to the public. We are too busy to tell our own story. Therefore, we let you tell it for us."

I have yet to see any defense of the policy of silence that would hold water. The elder John D. Rockefeller once told B. C. Forbes, the magazine publisher, that "Next to doing the right thing, the most important thing in the world is to let the people know that you are doing the right thing." The late Judge Gary, head of the Steel Corporation, once said: "The people have a right to know how the public's business is carried on, and the more they know about it, the better it will be." When Woodrow Wilson was President of the United States he spoke before the American Electric Railway Associa-

tion in 1915 and said: "There is no use inviting suspicion by secretiveness. If a business is being honorably done and successfully done, you ought to be pleased to turn it inside out and let the people whom you are inviting to invest in it see exactly how it is done and with what results." Henry Ford has said: "The biggest job before the utilities of the United States is to get electricity into the minds of the people." Eleven years ago Samuel Insull said: "If we openly and boldly do our share in this crisis by challenging the fallacies and misrepresentations uttered against the public utility business we shall be doing a service to the whole state and to the future generations of its citizens." Twenty-five years ago Charles Evans Hughes, now Chief Justice of the United States Supreme Court, said: ". . . that public affairs, and business which is of a public nature because of its relation to the public interest, shall be conducted in the light of day, and that the public shall have the truth, the whole truth and nothing but the truth, in regard to the matters that concern them."

Attack on regulation a smoke screen

The trouble is that we have not carried out nearly to the extent that we should have the advice of these business leaders of international reputation—the advice that we tell the public the story of our industry. Let us forget that we have neglected an adequate public presentation of our service to people in the recent past. Let us turn our attention to the future and let us correct our past oversight.

The recent claims that commission regulation has failed and the growing attacks on the various commissions constitute to a large degree a smoke screen for federal regulation at Washington and for government or municipal ownership and operation. Any one at all familiar with the various commission decisions realizes the valuable service they have performed, the various rate reductions and service improvements for which they are responsible. If our critics really believe that both the companies and the commissions have betrayed the public, as some of these critics say they believe, the fact still remains that more electricity is used in the United States than in all of the rest of the world combined and that our industry in America furnishes the highest standard of service on the lowest basis in the world.

There are plenty of facts on our side. The question is: What are we going to do with those facts?

The utilities constitute the open door to state socialism. Ultimate political power is in the hands of the people. In recent years politics has assumed more and more of an economic aspect and economics has sometimes seemed to have assumed more and more of a political aspect. The attacks on our industry are an excellent illustration of the blending of the economic and the political. It is this very blending that indicates the growing importance of public relations. Why is this true? Because good public relations weaken the hand of the politician who seeks an object of attack in order to advance his own interests. If our utilities are well liked by their customers who are informed as to these vital issues, it becomes more difficult for any one to build up a substantial following by attacking our utilities. He will have little success attacking something that is popular with the public. The understanding and good will of the

Civic Center floodlighted for N.E.L.A.

San Francisco massed 1,000 floodlights, ranging from 500 to 1,000 watts, and 3,000 incandescent lamps, totaling 1,750,000 cp., with a connected load of 875 kw., for the convention display.

public thus become a bulwark against the host of radical or political attacks.

Famines, earthquakes, murders, robbery—these and other similar things do not keep the average man awake at night, provided they take place at distant points. People merely shrug their shoulders and say: "Too bad—yes, sir, that's certainly too bad." Then they go out to play golf or bridge or go to a ball game or go shopping and forget it. But let some comparatively trifling event touch a man's life in a direct and personal way and he will set up a howl that can be heard a block away. *He* has now been hurt—although perhaps very slightly—and he is going to lose no time telling the world about his grievance. Your typical American dislikes one thing very much—he hates to think, to use a slang expression, that he is getting "soaked." Let him get the faintest suspicion that his electric light and power bill should be a few cents lower and he forthwith goes on the warpath. If he believes that his utility is discriminating against him or that it is overcharging him, he will attend mass meetings to protest, he will write his newspaper and he will tell his friends. I repeat—the small, intimate, personal things that touch a person's life are the things that most concern him.

When you, therefore, view this whole public relations situation, I think you will agree with me as to its growing importance. We of the Public Relations National Section have felt that the best way to face this condition was to explain broadly, consistently and on a widespread basis the real facts of our service—both through the spoken and the written word. Our activities this year have been planned toward this end. We have encouraged a variety of sound public relations activities, each designed to contribute to a better public understanding of our industry.

Let me conclude with this thought: In my opinion and in that of other utility executives who have closely followed the general situation, the next two or three years will call for our very best efforts along public relations lines, and I hope that you will, each and every one in the industry, take an active part in our program.

$10,000 BONBRIGHT PRIZE

Goes to Winner's Widow

STRANGE are the ways of fate! Little did Reuben B. Sleight think when he competed for the prizes offered five years ago for the best five-year review and five-year forecast of the electric utility industry that he would pass to the great beyond before the final $10,000 Bonbright prize given in the name of the American Superpower Corporation would be awarded and that his widow would be its recipient.

Mr. Sleight, who was formerly connected with the Minnesota Tax Commission and had later served for more than a year as an aid to Secretary of Commerce Hoover, was killed in an airplane accident on November 14, 1927, while flying from Washington, D. C., to Montpelier, Vt.

Other essays contained a greater number of specific forecasts, and some of these forecasts were more accurate than those of Mr. Sleight. Still others contained isolated strokes of brilliant prophecy. However, Mr. Sleight excelled in general treatment, and the judges had no difficulty in reaching the unanimous conclusion that the prize be awarded for his essay. Comparisons of an average of some of the estimates of the five leading essays with conditions that developed are given in the table below.

In reviewing the essays in 1925, the judges were impressed by the almost universal optimism expressed in estimates of the growth of the industry between 1925 and 1930. But it now appears that actual results have, generally speaking, exceeded the forecasts made five years ago.

	1930 Conditions				
	Energy Generated (Kw.-Hr.)	Generator Rating (Kw.)	Gross Revenue	Capital Invested	Customers
Actual	91,421,459,000	30,021,000	$2,106,000,000	$11,100,000,000	24,257,159
Predicted	87,151,617,000	31,089,000	$2,061,076,000	$9,802,000,000	21,978,400

Accountant's Relation to Management

By FRANKLIN T. GRIFFITH

President Pacific Northwest Public Service Company

MANAGEMENT is far more interested in the interpretation of the figures than in the figures themselves; financial figures alone will not reveal many things the management would like to know. Therefore, when making up statements, the accountant should keep in mind the use to which the figures are to be put and mold his statements in a way that will be most valuable to the one who is going to use them. This involves a counter obligation on the part of the management to give the accountant an idea of the use to which the compilations are to be put in order that he may be in a position to make up the statements intelligently and supply the information desired.

The accountant must analyze and interpret and prepare his material in such a way that the executive officer can get at the heart of the matter in the least possible time and with the minimum of effort. He must foresee, as far as possible, the use to which the data are to be put and anticipate the relations involved. He should aim to condense the results so that the executive may be able to get the results quickly without wasting his time in wading through a mass of detail. Of course the detail must be there to back up the results, but the busy executive is interested in the results rather than in the detail from which they come.

The entire tendency of modern business is toward consolidation. This means that more and more executive direction must be based upon reports. The importance of reports and statements must unquestionably increase. Consequently, if the accountants are awake to their opportunity the work they are doing must increase in importance. Management now is to a large extent a question of finance, especially in utility companies, where the investment causes the major portion of the expense. The accountant with his fundamental financial training should be in a position to give increasingly greater assistance to the management in solving the colossal problems confronting the utilities of the future.

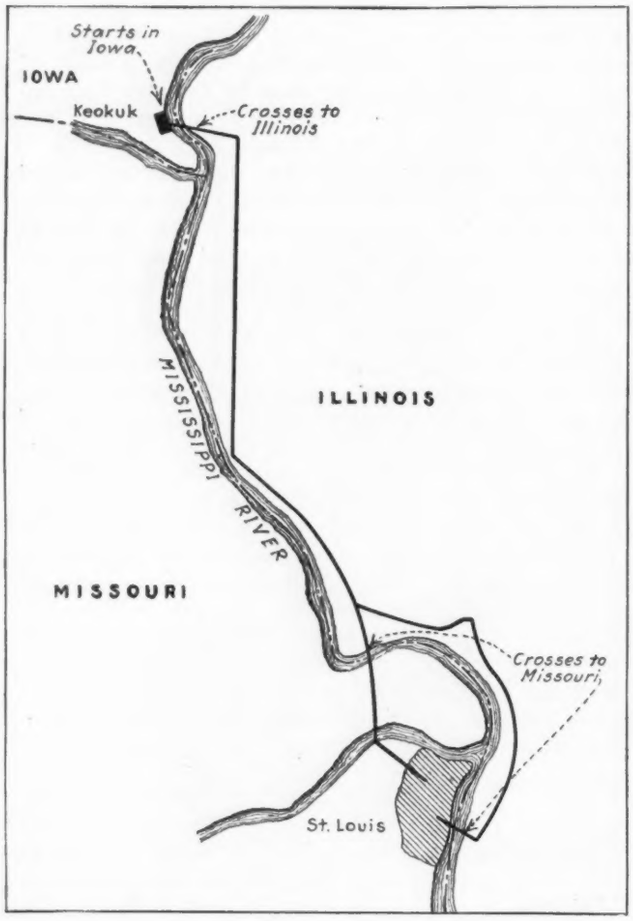
There are many unsolved problems for the solution of which the management must look to the accountant. For illustration, the handling of depreciation is one of the most perplexing problems before the utilities. A solution of that question in a way that would be fair to the companies and fair to the public, and expressed in language that could be understood and applied in a practical manner, would be a great boon to the industry. It is a factor that cannot be neglected, and yet its application is attended with all sorts of difficulties. The question of standards of accomplishment by which the results of operation may be judged is another perplexing problem and one which needs solution. How to make the accounting a real thing of life in the present instead of a post-mortem is still another problem well worth consideration.

The Accountant's Opportunity

Grasp the vision of the future.
Eliminate detail in reports to the executives.
Make reports and audits tell story in fewest possible figures.
Save the management's time.
Graduate from a recorder of figures to an interpreter of figures.
Prepare to fill place in executive management.

State Lines Cut Industrial

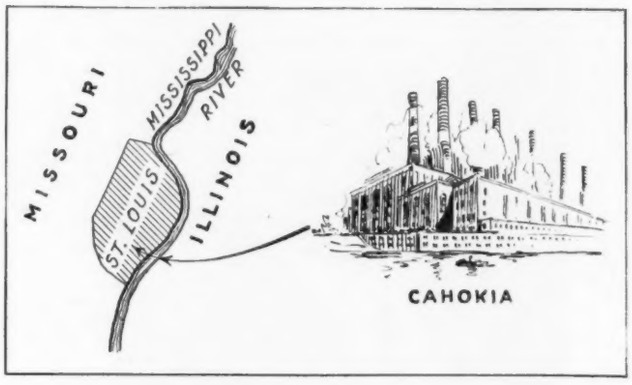
Double Counting Exaggerates



Where 500,000,000 kw.-hr. can be counted more than once, but should not be

Similar but usually more complicated conditions exist in other parts of the country.

Energy from the Keokuk, Iowa, water-power plant is used mainly in the St. Louis industrial area. It amounts to 5 per cent of the total interstate energy. It makes several crossings of state lines, but clearly should be counted only once. If the plant were at the eastern instead of western end of the dam it would be in Illinois; one boundary crossing would disappear. If a carload of shoes goes by a similar route from St. Louis into Iowa, does it become two carloads?



Kilowatt-hours or trainloads of coal into St. Louis?

Cahokia is in Illinois, only half a mile from the community it chiefly serves, but in another state. The energy it sends into Missouri is 6 per cent of the whole amount in the United States used outside of the state in which it is generated. Its location east of the Mississippi avoids occupation of part of the St. Louis River front by a large power station, haulage of coal across the river, with attendant costs and traffic, and the combustion in the city of a trainload of coal daily. Do these results warrant interference with economic operation?

OF THE 91,656,000,000 kw.-hr. generated in the United States in 1929 by central-station plants 80,800,000,000 kw.-hr. was generated and consumed in the same state; 10,856,000,000 kw.-hr., 11.8 per cent of the total, was transferred across state lines. By far the major share of the latter crossed because boundaries happen to cut between industrial areas and the water or fuel powers serving them; twenty such instances alone account for nearly two-thirds of it.

Important hydro plants thus separated from the power markets for which they were built wholly or in part and the portion they contributed to the energy generated in one state and used in another are:

Conowingo (Maryland)	11 per cent
Five Piedmont plants in South Carolina	5 per cent
Keokuk (Iowa)	5 per cent

Others are the Connecticut Valley group in New Hampshire and Vermont, Holtwood (Pennsylvania), Cheat Haven (West Virginia), the group in Wisconsin serving St. Paul and Minneapolis, the Idaho group

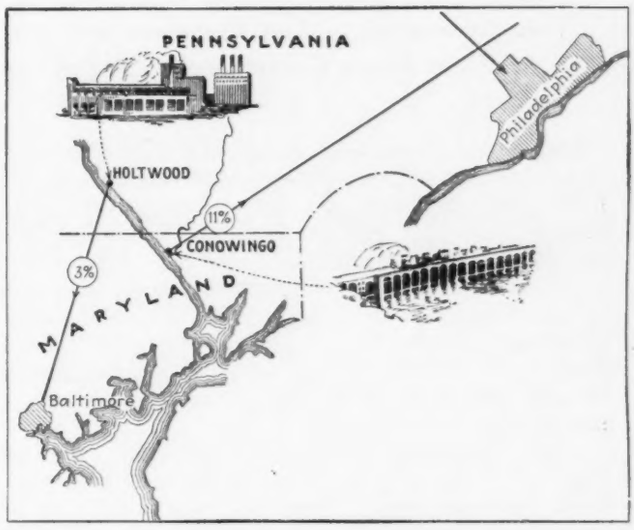
Areas from Power Sources

Proportion of Interstate Power

serving Salt Lake City, Bishop Creek (Georgia), Bartlett's Ferry (Alabama), Youghiogheny (Maryland), Chalk Hill Rapids (Michigan). Altogether these thirteen plants or groups supplied 37.5 per cent of the interstate power.

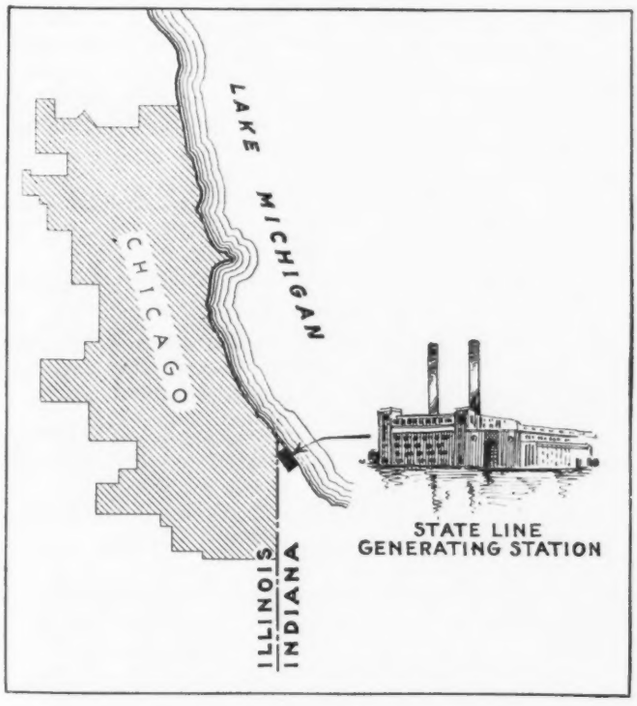
Similarly, seven steam plants or groups supplied 25.5 per cent:

Windsor (West Virginia)	7 per cent
Cahokia (Illinois)	6 per cent
State Line (Indiana)	4 per cent



Both ways across Mason and Dixon's line

Each plant is but a few miles from the boundary. Conowingo transmits to Philadelphia, Holtwood to Baltimore. Together they contribute 14 per cent of all the energy generated in one state in the Union and used in another. It is easy to imagine a change whereby as much energy might have gone from the lower Susquehanna to Philadelphia as now, and as much to Baltimore, but far less would cross the state line. Or the boundary might have been shifted a trifle, when it was first run through the wilderness. But, the developments being as they are, should the use of this water be hampered?



Just outside of Chicago

State Line plant contributes energy to Chicago industrial area. It is in Indiana; its western property line is on the interstate boundary. Into Illinois last year it sent 4 per cent of all interstate energy, though operated only six months. This may easily grow to 1,000,000,000 kw.-hr. annually. Would the hourly burning within the city of Chicago of another hundred tons of coal help matters?

The remaining 8.5 per cent came from Sterlington (Louisiana), Montaup (Massachusetts), Lowellville (Ohio), Glen Lyn (Virginia).

Thus the 37.5 per cent contributed by the hydro and the 25.5 per cent by the steam plants mentioned, all close to their industrial service areas but separated from them by interstate lines, constitutes 63 per cent of the total interstate consumption.

Where more than one state line intervenes there is danger that energy may illogically be counted several times, with consequently inflated totals. Thus an available excess of hydro in northern New England can serve Connecticut only by crossing Massachusetts. North Carolina in a drought can get help from the Alabama coal fields, but only through other states.

National Barriers Removed

Some greetings conveyed by telephone, cable and radio from San Francisco, Berlin, London and West Orange to the delegates attending the National Electric Light Association convention in San Francisco and the World Power Conference in Berlin

During my trip around the world the most interesting objects of my study were the research laboratories which have been established, not only as exclusively governmental institutions, but also in connection with universities and industrial establishments.

While the knowledge [imparted by them] may appear purely theoretical, it is nevertheless of great practical importance, for the results of scientific research form the foundations of discovery, discovery aids technology, and through improved technology economic status is enhanced.

I hope particularly for a broadening sphere of research and for an increasingly close co-operation between nations, for it is precisely these which are adapted to bind the several nations together in friendship. That it is possible, my personal experience proves.

The valued friendships which bind me with men of different nations, especially with Americans, are not due to business relations, but to our common endeavor to promote science and technology and through exhibitions and museums to make knowledge available to the greatest number of people.

DR. OSKAR VON MILLER,
Honorary Chairman Second World Power Conference, Berlin.

When nations unite in co-operative effort for the benefit of all humanity there will be evolved a wiser, kinder, truer internationalism, linking in closer bonds the people of the earth. For that reason I am constrained to express the hope that a broader culture might ensue from this meeting of expert minds. May I also suggest that the way for better understanding and mutual good will depends upon the method of approach?

I urge all my listeners, whenever they can, to travel abroad and see as much as possible of other peoples and their lands and try to understand their point of view.

If we think only in terms of our own country, we beget a selfish and restricted outlook upon life and public policy. If, on the other hand, we deal with other nations as with friendly neighbors, place our knowledge and experience at the service of all, we have a more liberal and inspiring outlook.

Any conference made up of such minds cannot but make an invaluable contribution to civilization.

LORD DERBY,
President First World Power Conference

All of us are inspired by the idea of applying the knowledge and results of natural science which we turn into engineering progress to the benefit of mankind. We engineers know no difference of race and no boundaries of countries. The progress made in one country belongs to the whole world.

DR. CARL KOETTGEN,
Chairman Second World Power Conference, Berlin.

The meetings you are now attending have a significant importance to a world which is ever looking for further advancement in its comforts and conveniences arising from improvements in the methods of generation and distribution of electricity for light, heat and power.

I have been deeply impressed in observing the magnificent proportions to which electrical development has attained. This wonderful culmination has been achieved through the labors of many men of many minds in the fifty years that have elapsed since the unprecedented but effectual foundations were laid for the broad system of electric light, heat and power.

THOMAS A. EDISON,
West Orange, N. J.

The interchange of ideas and information between different nations advances power development and promotes economic progress. We gratefully acknowledge the great technical contribution of Germany and other countries to electrical progress in the United States.

MATTHEW S. SLOAN,
President National Electric Light Association.

You who represent the electrical industry everywhere are the trustees of the ideas and achievements of the scientific geniuses of the world. As such it is your duty and your privilege to set them most usefully and most widely at work.

OWEN D. YOUNG,
Chairman of the Board General Electric Company

This participation has been made possible by the great advances in radio and telephonic communication which have now come into active being and which have already linked up the world in a way which was never experienced before. This linking up of the world, together with the means of utilizing and distributing electrical power and the transport of power over great distances, has been

achieved only by the co-operation of the scientists, the engineers, the industrial organizations and the governments of many nations.

We are perhaps only now beginning to realize the full benefits the world can reap from a true co-operation between the industrial organizations of the civilized peoples of all lands. Without denying the stimulus of healthy competition, it is my humble opinion that the human race will benefit to a still larger extent by a truly honest and rational co-operation such as these great meetings exemplify so well. The power of our best thoughts must be the true carrier of civilization and of efficiency—the power which should forever tend to promote and cement good will and co-operation between nations and which I firmly believe is inevitably destined to prevent the horrors of war by bringing about a more and more perfect understanding between all peoples.

GUGLIELMO MARCONI,
Radio Pioneer, Scientist.

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Eternal Vigilance the Price of Commercial Success

By V. M. F. TALLMAN

Vice-Chairman National Commercial Section

ADEQUATELY prepared personnel, intensive cultivation of new business and unceasing attention to customers' needs are demanded for continued commercial success in the power industry. Since the last convention more than 90 men have been active in carrying on sales development work for the benefit of member companies with the major objective of making the invested dollar earn a greater return. Sixteen reports have been published or prepared; increased attention has been paid to training men for power sales, commercial industrial heating, electric cooking and other load-building service, and valuable co-operation has been rendered to many other organizations, with constant study of competitive power problems.

The most important problem facing the power sales organization today is the need of more careful selection of personnel. In many cases men go into the power sales department completely unprepared, without general knowledge of various company departments, policies or manufacturing problems. Satisfactory work is impossible under such conditions.

In most cases loss of power business can be traced to lack of adequate personnel, poor preparation or insufficient planning prior to approaching customers, or lack of suitable contacts with customers, present or prospective.

Our power salesmen must be shown that a plan of action and procedure must be laid out very definitely before a customer is approached in any important negotiation. Competent leadership is equally essential. Power salesmen must be extremely careful to obtain and present all the facts; to avoid submitting ideas in a loose manner and to make sure in writing or talking about power or heat that they are dealing with the true costs and not fooling themselves or their customers.

There is need of giving more attention to demand and load-factor elements in power rates and of considering the redesigning of old power schedules so as more nearly to approach the true costs of rendering service and to meet the true costs of competition. Some commissions have already begun to recognize this.

No less than 500 men have received special training in industrial electric heating in the past nine years, following a suggestion at a New England divisional convention some time since. The 1930 school was held at Los Angeles and San Francisco and was attended by 100 men, the largest enrollment ever realized. Industrial heating conferences have been held at five universities in recent years, and exhibits covering a total of 3,900

sq.ft. and attended by 353,000 visitors have been held in five cities under the sponsorship of the American Society for Steel Treating.

The heating committee has in preparation a 200-page loose-leaf handbook on industrial electric heating, which will be ready toward the end of this month. Next year it is hoped to hold a heating school in Chicago and to prepare serial reports on high-frequency furnaces, gray-iron melting, structural-steel welding, electric core baking and the malleableization of iron.

Industrial electric heating sales increased in fifteen prominent companies from 370,000,000 kw.-hr. to 760,000,000 kw.-hr. from 1924 to 1928.

It is estimated that in 1929 the industrial electric heating sales of the public utilities of the United States totaled 6,000,000,000 kw.-hr. and yielded a revenue of $70,000,000.

Commercial electric cooking and baking are gaining rapidly, and a 200-page sales manual on this subject has been placed on the market. Orders for the present supply have practically exhausted the edition. A useful serial report on marketing electricity for commercial baking has also been prepared during the year. Effective publicity has been attained through many channels, emphasizing the trade journals of the baking industry and through co-operation with caterers, bakers and architects' associations. Seventy-five men registered at the 1930 commercial cooking school and sales course held in Chicago. These men were in general mature and of sufficiently responsible authority to accomplish important results in the sales field through organization and field activities. A 250-page sales course textbook was used containing material supplied by central stations, the Edison Electric Appliance and Westinghouse companies.

The problem ahead lies in educating the architect, tradesman and central-station man to the value of interrelating electric cooking with sound merchandising for this class of business. Plans are under way for the organization of commercial cooking specialists representing all companies in the New York City district to promote this business, and this is expected to stimulate other sections. The cost of serving this class of load is relatively small; the revenue per dollar of investment is large, and many pieces of cooking equipment can be sold almost regardless of the electric rate.

The Cleveland Electric Illuminating Company developed 800 kw. in commercial heating load last year despite natural-gas competition at 50 cents per 1,000 cu.ft.

There is no segregation of the food preparation industry to particular localities, so that the market is nation-wide.

Electric truck business is being steadily developed and widespread publicity matter is being distributed by the committee on this subject. About 5,500 folders on the advantages of this service are now being printed. Manufacturers of industrial trucks have organized to promote sales and are giving 100 per cent co-operation to the committee.

We know that executives recognize the personnel problem and the difficulties of obtaining the high type of men necessary for this large-volume work.

With the proper personnel, adequate rates and the new vents which are constantly being opened to those with imagination, it seems to us that the advantage which the American worker has in possessing three to four times as much horsepower as in any other country will be increased again. Already in New York State alone more electricity is used than in any country outside the United States except Germany.

Without the public utilities industry we believe that American factory workers would not have wages relatively higher than in other countries, nor would customers obtain the benefits of the lower selling costs.

Each of our laborers has become a controller of power—all resulting in the development of greater wealth in this country. In March, 1930, the people of 43 states used nearly 26,000,000 gal. of gasoline daily, or 7 per cent more than a year ago. This means $5,000,000 a day and is an indication of the expansion of the country. This expansion cannot be stopped.

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Electrical Advertising an Investment, Says J. E. Davidson

President Nebraska Power Company

TO ME electrical advertising is not a lighting expense. It is an investment to create greater return on the investment already made.

Just think of it, as much money was spent for advertising as was paid to all of our utilities for furnishing electric service to the nation, and of this tremendous amount it is estimated that only $70,000,000 was spent for electrical advertising. This fact should make us all blush with shame, for we of the electrical industry control this type of business. Blame for neglect of this revenue must rest with us. It is our own fault.

The amount spent for electrical advertising should be at least $300,000,000 a year, of which $200,000,000 would be spent for the direct promotion of energy sales.

Electrical advertising is not and should not be a stepchild of our industry. It's a good, legitimate, healthy creation that will stand for much development.

Utilities Should Finance Rural Service Lines

By M. S. WINDER

Executive Secretary
American Farm Bureau Federation, Chicago

THE expansion of electricity to the farms of America must be speeded up by every consistent means. It is recognized that rural electrification is possible only where the electrical industry is organized in units large enough to make such enterprise feasible. For a small municipal plant to undertake a program of rural expansion is entirely beyond reasonable expectation. The American Farm Bureau Federation at its first annual meeting, in 1919, gave serious thought to the various problems confronting not only agriculture but all the people of this country. After due deliberation a resolution was adopted which briefly and emphatically declares: "We are opposed to government ownership of public utilities." Members of the Farm Bureau have adhered to this policy, for in each succeeding year this position with respect to the ownership of public utilities has been reaffirmed.

The interests of the farmers of America cannot be best served by government ownership and operation of the utilities from which we are to expect to receive service.

We recognize that it would be quite impossible for any municipal power enterprise to undertake a program of rural expansion. What city could expend money for extension of its municipal power lines beyond its bounds? It is the private power companies which are adding to their number of subscribers by enrolling thousands of farmsteads each year.

While we positively declare against government ownership or operation of public utilities, we do believe in proper government regulation of these service companies. That regulation must be intelligent and efficient. It is interesting to note that quite recently Governor Roosevelt of New York, in discussing the extension of a rural electrical service in New York State, suggested the desirability of adding a competent head to a rural electrification division in the Public Service Commission. He believes that such an officer would be very helpful in formulating ways and means to bring cheap electrical current to all the rural population of that state. Certainly the establishment of a department dealing with rural electrification in each state body, charged with responsibility for regulating public utilities, would be a great step forward in hastening a program of rural electrification.

A few years ago most farm people thought of electricity on farms only in terms of the convenience that would come from being provided with electric lights. Today farmers everywhere are clearly recognizing the fact that electrical power for lighting purposes, while important, represents only a very small use to which this energy can be put. Some 250 different farm operations by electricity have been tested and found practical by our Committee on the Relation of Electricity to Agriculture. It is not uncommon to find electrified farms where the principal use of current is the operation of heavy power-driven machinery ranging through a considerable number of farm operations.

Rural users of electricity rapidly increasing

Today there are in this country approximately six hundred thousand farms provided with central-station electrical service. In addition to this great number, there is another large group provided with individual electric plants. This number of rural users of electricity is increasing at an astonishingly rapid rate.

New uses for electricity on the farm are constantly being developed, and no doubt the next few years will find electricity being used in farm operations where today it is not imagined that this energy can be applied. In many instances in the past extensive use of electrical energy on farms has been slow in coming because of the fact that the farmer has been obliged to finance the extension of rural service lines for the power companies. His money being thus expended, he has not had funds

available for the purchase of electrical equipment, and for that reason has been obliged in many instances to limit his use of electricity to lighting and a few other very simple and necessary functions. Where power companies have financed the building of rural extensions, the farmers have been better able to invest available funds in electrical devices and power-consuming equipment. Their employment of electrical energy thus being much more extensive, these rural lines, as a consequence, have rapidly developed very satisfactory current loads throughout the whole year, and as another consequence, rates for this current have been reduced, thus further benefiting the farmer.

From the point of view of those engaged in agriculture, nothing can be more shortsighted than for the power companies to insist upon their rural patrons advancing funds for the purpose of paying for lines extended into rural territory. Great credit is due the companies, notably the Mid West utility group, which have had the foresight and wisdom to take an advanced position, themselves financing the building of rural lines wherever this development seemed justified. Through the co-operative efforts of the National Electric Light Association, the farmers' organizations and the educational forces working in the interest of agriculture, farm people everywhere realize today the benefits that will come to them through generous use of electrical energy. Not only do the farmers appreciate the advantages they will receive in improving their farm practices, but they appreciate the importance of modernizing the farm home. No farm home can be truly modern and enjoy the comforts that it should possess until it has been provided with electrical service.

The demands of American farmers will not be satisfied until every farm within reasonable reach of central-station service has been provided with electricity.

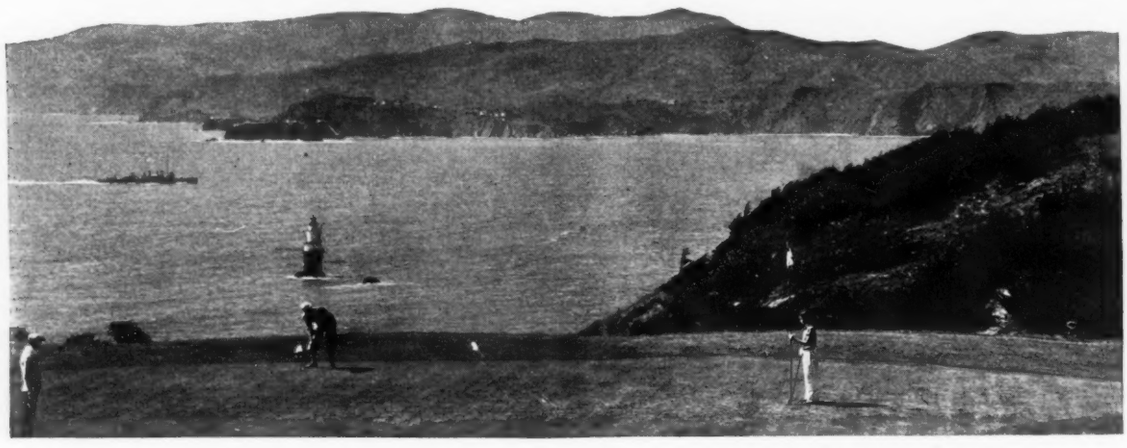
In past years the greatest extension of the use of electricity has been within the cities and larger towns. No doubt the maximum consumption of electricity in urban centers has by no means been reached up to the present time. Whether or not this is the case, I feel that we can say with assurance that the greatest future expansion of the electrical industry will lie in the farm field. Full use of electrical energy in agricultural processes already adapted to it will build up a demand for electrical power which few have even contemplated. The development of new uses for electricity in agriculture may in the future provide a demand for electrical energy far in excess of any demand that industry has made up to the present time.

Future possibilities huge

One insistent necessity at the present moment is that we be able to vision the possibilities of the future; that we be able to realize how agriculture might carry on as a liberal consumer of electrical energy.

We must try to fancy 6,000,000 farm families employing electrical energy to perform the many menial tasks that have in such great measure made agriculture unattractive. We must think of pressure water systems, driven by electricity, to pump water for live stock and the numerous other abundant uses for water around the farm and the farm home. We must think of feed grinders electrically operated and providing better rations at less expense for milk cows and live stock. We must think of all the power-driven machinery of the farm, the threshing machines, the power saws, the grindstones, milking machines, separators, being quietly and efficiently operated by electrical current. Then if in the farm home we could vision electric ranges, electric refrigeration, electric water heaters, vacuum sweepers, washing machines, mangles, flatirons, and all the comforts and conveniences which at the present time go to make the life of the city dweller more pleasant than that of country dwellers; if we could see these things and realize that the extension of electrical service to the farms of America would make this possible and would make possible, too, an outlet for electrical power so great that it is hard to conceive, we could then gain an idea of the importance of electricity to agriculture and to country life, and of the importance of agriculture as a potential user of electricity.

The co-operation which electricity has extended to agriculture in the past must be continued. There must be an even better understanding of our mutual problems hereafter. Electricity can and will be an important factor in preserving that great institution, the American farm home, with the American family, rather than an impersonal corporation, as its owner and operator.



Golden Gate

What Regulation Has Achieved

By WILLIAM J. HAGENAH

Vice-President
Byllesby Engineering & Management Corporation

STATE regulation has accomplished the beneficial objectives toward which the utility laws were directed. Analyzing the records of the last twenty years, during which regulation has been the prevailing state policy, three accomplishments stand out. These are, first, the amazing expansion of the industry; second, the development of centralized utility control and management, and, third, the great public benefits that have resulted therefrom. The facts pertaining to these subjects show that the power industry has become a truly public service industry.

Centralized management grew out of the rapid expansion of the industry and the problems created by public regulation. Just as it was economical to merge the physical forces of production, so changing conditions made necessary concentration and specialization in management. This system provided each utility situation with managerial service equal to that of the metropolitan utilities and at a pro rata cost far below what equally efficient independent local management would cost. It brought together a permanent staff of trained engineers, accountants, lawyers and rate experts—specialists in the various phases of utility management and regulation—who pass on the problems of each local situation that the holding company controls, constantly studying its needs so that the best operating results and public relations may be obtained.

This staff constructs and reconstructs plants according to the most modern practices; standardizes operating routines; conducts new business campaigns in each community calculated to produce the best loading of the local facilities; carries on research work in industries, in homes and on farms, to reduce electric service costs and to stimulate further consumption; aids in the location of industries in communities having excess power capacity or natural advantages; designs rate schedules properly adapted to the needs of each community; installs accounting systems conforming to commission requirements and sees that they are properly followed; maintains a central purchasing department, through which the most favorable discounts are obtained, and arranges for the necessary financing of each utility on the most favorable basis.

The development of this system has been hastened and its form largely determined by the service rules and decisions of the state commissions. Without the exacting rate and service requirements of the public, the movement for centralized control and management would have developed much more slowly, and perhaps might not have functioned so advantageously for the public good as it now does.

Benefits from centralization

Utilities serving the larger cities generally possess ample resources and managerial skill, but the smaller communities can obtain the necessary credit, adequate service and low rates only through the facilities which the holding company and centralized management provide. Analyses of holding company operations disclose that the great majority of the communities served by them have populations of less than 5,000, while many are of less than 1,000 population. A large percentage of the population of the United States resides in such communities, which are more and more being supplied from a network of transmission lines. Although offering little business inducement when standing alone, they furnish, when thus combined, a solid background for a great industry from which all interests benefit. Because of this development limited-hour service has given way to continuous service; adequate service has been supplied where none was available before; obsolete and poorly constructed distribution systems have been replaced with efficient systems, and unscientific rates have been discarded in favor of properly balanced schedules that stimulate the maximum use of the service.

Studies of typical groups of electrical utilities covering wide territories and with centralized control and management show that these developments under public supervision have operated enormously to the advantage of the public.

Scores of consolidated systems throughout the United

Holding Companies Immediately Improve Service and Reduce Rates, William J. Hagenah Points Out

Southern group, serving 174 communities.—Only four of these have populations in excess of 20,000; 32 range from 2,000 to 20,000; 27 are between 1,000 and 2,000; and 111 have populations of less than 1,000. Eighty-two of these communities were previously served by small privately owned companies. Every variety of equipment was in use; operating methods were obsolete and inefficient; and the management often lacked ability and vision. Twenty-two of the properties were acquired from municipalities, and the conditions that obtained there were at least as bad. Seventy of the communities never had any electric service previous to becoming a part of this system.

As soon as each of these properties was acquired, expert engineering and rate studies were made to ascertain their needs. In all of the communities taken over from previous owners it was necessary to rehabilitate the distribution system in whole or in part before adequate and efficient service was possible. In 65 of these 104 communities it was necessary to make important station or line extensions, the inability of the prior owners to finance these having prompted the sale to the consolidated system. In 85 communities additional equipment was provided to correct service defects which had previously prevented proper load building. Nineteen communities which had formerly enjoyed electric service only during the hours of darkness, and were therefore limited to lighting uses only, were provided with 24-hour service, and complete service was supplied in the 70 communities which previously had no electric service. Thirty-four small low-efficiency stations were withdrawn from operation and service provided from large modern stations strategically located, from which a network of transmission lines now radiates to 165 of these communities.

In every instance modern rate schedules were put into effect. Within less than one year following the date of acquisition by the holding company, domestic rates had been reduced in 93 of the communities, averaging over 20 per cent in typical residence bills; commercial lighting rates were reduced nearly 10 per cent in 74 communities; and reductions in the general power rate were made in 89 communities. In most instances there was such a prompt response to the improvement in service and adjustment in rates that further reductions quickly followed. In the last ten years, in the residential service alone, 42 cities and villages have received two downward adjustments in their schedules; 21 received three such reductions; 25 have had four reductions; 29 have had five downward revisions; 30 have had six reductions; and in 12 communities there have been seven changes in the schedules, all operating to reduce the customers' monthly bills. Similar downward changes were made in the commercial schedules, cooking schedules and power rates.

Further, through these reductions the rates were largely standardized. At the close of 1929, 80 per cent of these communities were being served on a uniform residential schedule; 71 per cent were served on uniform commercial lighting rates; 81 per cent were on a uniform small power rate schedule; and practically all the wholesale power throughout the territory served was furnished on a standard rate.

This record of performance was accomplished without rate contests before the state commission, but in every major step the co-operation of that body was had with a view to avoiding unnecessary expense and hastening the day when the maximum benefits could be enjoyed. There were no lengthy decisions ordering these reductions and no public hearings were found necessary. The service was improved and rates were reduced because it was good business to do so, and with the state commission's precedents established, an intelligent management was able to apply them. It is this kind of business development and public co-operation that produces the best results for the customers.

Northeastern company, serving 382 communities with a combined population of 1,100,000.—Only 23 of these communities have populations in excess of 5,000; 56 range in population from 5,000 down to 1,000; while 303 are of less than 1,000 population. Practically an entire state is covered with the transmission lines tying together over 40 steam and hydro-electric stations. Along these lines are 150 small localities, which except for such lines would be without electrical service. The performance of this large group during the last ten years alone shows 49 previously local independent utilities connected with the system which immediately received the same standard of service as obtained in the large cities and within the first year after their acquisition secured rate reductions aggregating $500,000. Twenty-one previously municipally-owned plants were taken over, each of which was rehabilitated, and in addition their customers received immediate reductions in rates amounting to $280,000 per year. One entire group, embracing 150 cities and towns, was absorbed and immediately given the same rates as the standard schedule in effect on the system of the purchasing company, with a saving to the ratepayers in the newly acquired communities of over $250,000 per year. The total voluntary rate reductions for this group since 1925 averages over $1,700,000 per year, largely made possible by the consolidation of plants and centralized management. This company has never had a general rate case nor its property appraised by the state, but every important step in matters of extensions, service improvements and rate reductions was undertaken by the company officials with the assistance and approval of the utility commission.

Northwestern company, serving 411 communities with an aggregate population of 1,200,000.—Only twenty cities in this group have populations exceeding 5,000; 57 range in population from 5,000 down to 1,000, and 334 communities have less than 1,000 population. Nearly four thousand farms are also served. This large group has been assembled and co-ordinated with the industrial, commercial and agricultural needs of the state since the beginning of public regulation. Two hundred and sixty-five of these communities had previously been served by small privately operated companies; 20 were acquired from municipalities; and 126 of the presently served communities were without any electric service until acquired by this company and connected with its transmission lines, when the most modern local distribution systems were constructed.

Technical studies were made of each local situation which resulted in immediate public benefits. Substantial rehabilitation work and extensions were undertaken at once in 250 communities, these being necessary before proper service could be furnished. In 252 communities admittedly bad operating conditions were improved by the installation of additional equipment and in 19 communities the previously limited-hour service was discontinued in favor of 24-hour service. Within the first year after acquisition of these properties by the controlling group residence rates were voluntarily reduced in 129 communities, averaging 28 per cent on typical household bills; in 72 communities the commercial lighting rates were reduced an average of 250 per cent; and in 119 communities power rates were reduced an average of 29 per cent. In only two communities was it necessary to make rate changes that involved slight increases.

With improved service conditions and the use of accurate rate schedules, the public response was quick in every class of service. Since 1920 there are 143 communities in which residential rates were voluntarily reduced on two occasions; 125 communities have received three reductions; and 97 communities have received four different rate reductions. Substantially the same revision downward occurred in the commercial lighting, cooking and power service.

States can report similar accomplishments in thousands of instances, involving extensions to remote sections, vast service improvements and a succession of rate reductions. The entire industry is today in a sense competing with itself in the search for still wider uses for electricity and for means by which rates can be further reduced to invite such new uses. All this has come about through a genuine faith of the public in this industry, encouraged and protected by the law, and through the regulatory work of the state commissions. Millions of dollars have in this manner been saved to electric consumers each year through voluntary reductions. To talk of inflated property values and threatening rate increases in the face of these facts is sheer nonsense. The economic welfare of the industry presses altogether in the opposite direction. With the law and the practice of regulation now firmly established, with the duties of the utilities and the obligations of the public better understood, long-drawn-out and expensive rate controversies are disappearing in favor of thousands of informal conferences between company officials and the state commissions seeking the prompt application of established rules to developing situations.

Significance to public policies

Utilities have become the most regulated and most investigated industry in history. The value of their properties is determined for them by the state, their accounting systems are prescribed by the state and their accounts are audited by the state; their transactions are all subject to public examination, their measure of return is fixed for them; the rates they charge are prescribed by the state, and they generally can issue no securities except with the approval of the state. Every contact between a holding company or management organization and its operating subsidiaries is subject to the closest scrutiny by the state. Parent companies can obtain no profits through their control of the stock of the operating units by the collection of management fees, construction charges or new stock issues except with the knowledge and approval of the states.

In 1913 the index numbers for the reproduction cost and the weighted average actual cost of electric utility properties both stood at 100. Following that year, due to the war, the reproduction cost index increased violently, reaching the extreme point of 196 in 1920, but thereafter steadily declined to a present index number of 168, and there is a strong likelihood of a further decline. Because of the large amount of new construction each year subsequent to 1913, and the replacement of old low-cost property with new property acquired at much higher levels, the index of the weighted average cost of properties now in use has increased to 152; that is, sixteen points or 10 per cent below the reproduction cost. Due to the economic readjustment of price levels that has been under way for ten years, these two lines are steadily converging and will probably again be in agreement in the near future.

Even now, when effect is given to existing depreciation in the estimated reproduction cost of electric properties, as is required by law, the result is substantially the same as their original cost, and further discussion of the relative weight to be attached to "reproduction cost" and "original cost" in rate-making proceedings becomes purely academic. With a gradual downward movement of prices now reasonably in prospect, a public commitment at this time in favor of the so-called original cost theory, whether designated by that name or called a "contract," a "compact" or the "prudent investment theory," becomes highly inadvisable. If, however, the public persists in such a course, regardless of what its intention might be, any action having the effect of stabilizing the huge investment built up at high prices over the last fourteen years would tend to favor, rather than injure, the electrical industry.

For years economists have pointed out the benefits that would result from a wider distribution of wealth. The early concentration of corporate ownership in the hands of a few has long been cited as a dangerous trend and was pointed to as proof that the rich were growing richer and the poor, if not actually growing poorer, were at least not sharing in the growth of our national wealth. Surveys by investigating bodies, together with a study of recent corporation reports, indicate a wide public participation in the ownership of these utilities. During the last year the number of security holders of eight large holding company groups increased 60 per cent.

Banks, insurance companies and trustees are turning more and more to investments in public utility bonds and shares under encouraging state legislation. Strongly represented in this truly public ownership is the principal wealth-producing and tax-paying portion of our people. They are the thought-creating part of our citizenship. While attacks are being directed against both the utilities and the present system of regulation, the electrical industry goes forward.

THOSE who believe that the public should own public utilities have the opportunity of putting their belief into practice at the present moment by the purchase of stocks and bonds.

A good motto might be to so conduct your business that you can look any inquisitorial committee directly in the face at any time and tell them without fear or hesitation to go to their utmost limit in carrying forward any investigation that they may desire to undertake.

It will be a sad day for America when the expenditure of money for public utilities is to be determined by the political log-rolling and pork-barrel methods so frequently present in the legislative policies of our national Congress. It would open the door for the greatest system of graft and political corruption any nation could ever experience. It would change public utilities from tax-paying to tax-spending bodies and it would result, in my opinion, in the ultimate demoralization of government itself.

FRED W. SARGENT,
President Chicago & Northwestern Railway Company.

"A Girdle Round About the Earth" in 5½ Minutes

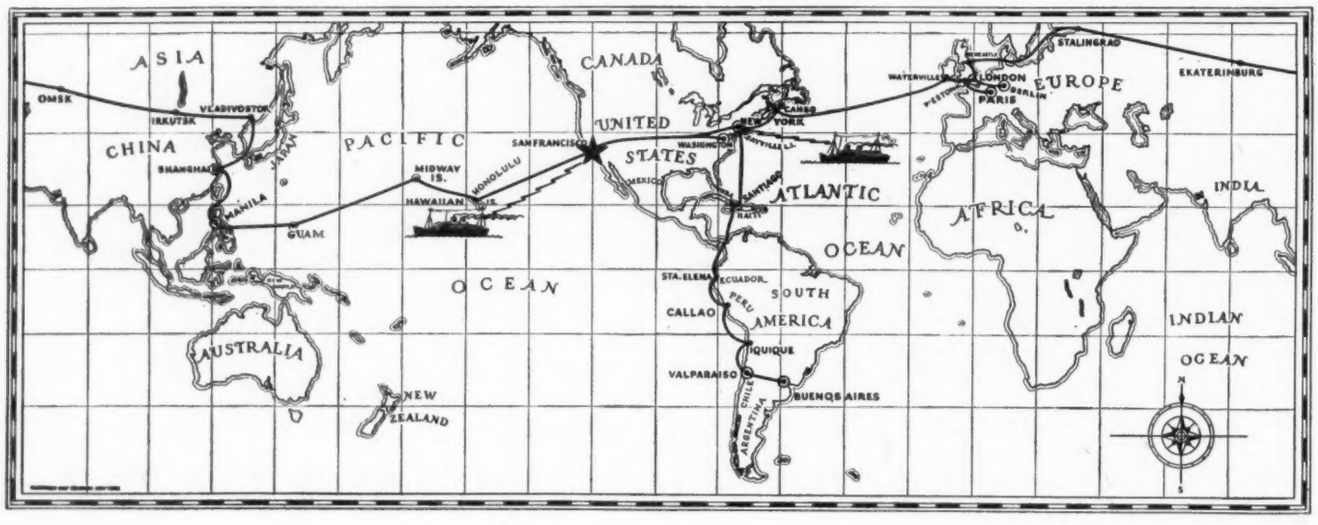
C. B. Allsopp

A. H. Griswold

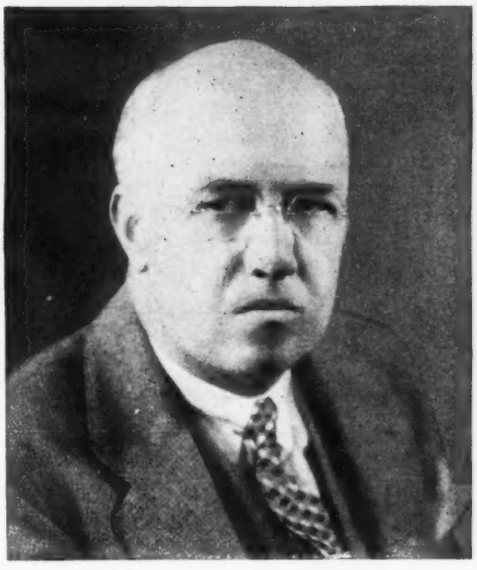
TO ILLUSTRATE the speed with which long-distance wire-and-cable telegraph messages can be handled, a telegram was sent westward around the world on June 19 from one delegate at the N.E.L.A. convention in San Francisco to another. From the time of delivery to the messenger to its receipt occupied 5½ minutes. It went uninterruptedly 9,000 miles by cable under the Pacific Ocean, via Honolulu, Midway Islands, Guam and Manila to Shanghai. There the message was transferred to land lines over the vast stretches of Siberia, through Stalingrad (sometimes Petrograd) to London, another 9,000 miles. Then the message was relayed by cable under the Atlantic Ocean to New York City, where it was transmitted by transcontinental circuits to San Francisco.

This demonstration, as well as an exchange of messages between San Francisco and ships in both the Atlantic and Pacific oceans, was staged by Col. A. H. Griswold, vice-president International Telephone & Telegraph Corporation, and vice-president Postal Telegraph-Cable Company, who described developments in technique and organization to perform this feat. He was assisted by C. B. Allsopp, vice-president Postal Telegraph Company.

It was emphasized that the co-ordinated efforts of the affiliated transmitting companies constituted a major factor in this demonstration. Pneumatic tubes at transfer points, relays and printing telegraphs figured prominently in the technical facilities which speeded the message at all handling points.



SELLING Complete Home Electrification



By EARL WHITEHORNE

Assistant Vice-President McGraw-Hill Publishing Company

NOT many years ago household appliances were looked upon as of relatively small importance. Industrial load loomed larger. The merchandising of appliances presented so many seemingly petty problems that it was considered an unjustifiable nuisance to men with utility management upon their minds.

Today, however, with nearly 20,000,000 residence customers on the lines, we see a 14 per cent increase in kilowatt-hour sales in the first quarter of this year, bringing such compensation for the loss in sales to industry in this period of slackened business that the value of the domestic load is no longer debatable.

While we have focused closely upon household equipment and domestic load, the men and women in these homes have been doing some thinking, too. Without our realizing it, the people whom we serve have begun to take the matter into their own hands. Before our unseeing eyes there has been crystallizing, slowly but irresistibly, one of those great forward steps in human progress that have marked the social evolution of the world. It is another great mass struggle for liberty in which we are to play a moving part.

Through the last quarter century there has been stirring the spirit of a new crusade, another struggle—this time a slowly crystallizing desire for domestic freedom—an escape from the time- and energy-consuming drudgery that has held womankind in bondage from the beginning. Only today has it become possible to hope for a release from the burden of toil that the keeping of a house has inescapably entailed since earliest times. The average woman glimpses dimly the light that shines ahead. Some day this idea will burst forth upon the people of the world like some great starry rocket and the world will seize it for its own. Then we electrical men will cease discussing whether normal families should or will use this or that electrical appliance. Complete electrical equipment in the home will have become part of our economic system, part of our normal lives.

We have approached it quite naturally, one step—one appliance—at a time. Now we see that it is not, after all, a matter of this appliance or that. It is the problem and the aspiration of the woman in her home that will control this vital development. The selling of one or two appliances clearly does not satisfy the need. It is a full-balanced equipment for the operation of the modern household that is desired and required.

The problem facing us is how we may sell this complete equipment, not piecemeal, but all at one time, how to effect the full-balanced installation when the house is built, so that it may be there ready when the family moves in, all financed in the mortgage.

The speculative builder is the key man in the picture. For speculative builders in this country last year were responsible for the erection of 65 per cent of all new homes. They equip them to meet the popular demand, so that they may sell quickly. But because we have not inspired public interest in complete equipment, this builder does not now provide it. But the experience of the modern bathroom has clearly demonstrated to us that if we can awaken public interest we can make complete electrical equipment standard in new homes. It will become the mark of the modern home as soon as the public fancy calls for it.

As we well know, all this will mean an immediate increase in the consumption of electrical energy in the 20,000,000 homes served by this industry—an increase of from 300 to 1,000 per cent in revenue from the domestic customer. It is an opportunity dazzling in its possibilities. Charles Harold, Brooklyn Edison Company, now heads a committee of the Commercial Section that will present to the incoming administration a carefully developed recommendation for action by this association to this end.

Hydro Yields to Steam on Economic Grounds

By F. B. LEWIS

Vice-President Southern California Edison Company

THE trend of power development in southern California, as evidenced by prevailing practice in operation and construction of additional generating resources, follows the pressure of economic forces, which bring their influence to bear on our industry, directing its course at all times along the line of least expense in rendering service to the public.

In the production phase of the utility business in southern California there has prevailed in the past the possibility of a choice in type of generating plant to be utilized by the electric service company in supplying enlarged plant capacity necessitated by the constantly increasing magnitude of service requirements. Whether to use hydro plants or steam plants as the next increment to production plant capacity has been a question which until recent years has been most frequently decided in favor of water-power development. During recent years there has been a pronounced trend away from further water-power development and toward the use of steam plants, both in southern and central California, by our large utility systems. This is not due to the physical exhaustion of water-power possibilities. Steam production has always been an economic competitor of water-power production in regions like the Pacific Coast, where water-power possibilities exist. Of the total water power potentially available to any region, certain projects, because of favorable hydraulic and topographic conditions peculiar to the particular development, can be constructed more cheaply than others.

Steam costs more than halved

At zero load factor the annual cost of steam power is less than that of water power. Under steam-plant efficiencies and fuel costs obtainable some years ago, the additional output expense of steam production, with increased load factor, caused total steam costs to exceed water-power costs, except at relatively small load factors. This condition was favorable to water-power development at relatively poor load factors and permitted the use of steam plants only for peak purposes, for standby to secondary water power and for load builders preliminary to further hydro development.

On the other hand, the output cost of steam production has been greatly lowered because of the cheap fuel situation now obtaining, as a result of more extensive production from our oil and natural-gas resources, and also on account of the increased size and greatly improved efficiency of the modern high-pressure steam plant, compared to the type of steam installation formerly available. The following figures, which represent the actual experience of the Southern California Edison Company, from 1925 to 1929, inclusive, forcefully illustrate the trend of steam-plant production costs:

	1925	1926	1927	1928	1929
Total operation and maintenance cost per kilowatt of installed capacity	$3.46	$2.37	$1.97	$1.83	$1.75
Average fuel cost per kilowatt-hour (mills)	2.7	2.3	2.1	1.7	1.4
Total production expense per kilowatt-hour (mills)	4.3	3.2	3.9	2.5	1.8

The increasingly higher cost levels at which additional water power can be developed and the lowering output cost of steam production are both in the same direction in their effect of crowding water power, if it is to qualify in this economic struggle with steam, to the prerequisite of producing prime power at larger and larger load factors.

Hydro even losing secondary value

The lowering of steam output costs has stripped water power of one former important asset, that of secondary power value. Measured by savings in fuel cost, secondary water power, under a fuel oil cost of $1.50 per barrel, and with steam plant efficiencies ranging near 220 kw.-hr. per barrel of oil, equivalent to 28,400 B.t.u. per kilowatt-hour, had a relatively high value per

kilowatt-hour. Today, with fuel obtainable in the form of surplus natural gas supplemented by fuel oil, at an equivalent weighted price of about 70 cents per barrel, and the larger modern steam plants showing an efficiency of 500 kw.-hr. per barrel, equivalent to 12,500 B.t.u. per kilowatt-hour, secondary water power has been reduced in value to approximately 20 per cent of its former value per kilowatt-hour at market centers.

Public and political obstacles

Two other factors in addition to steam plant competition militate against water-power development on the Pacific Coast; one is the legal situation in respect to a clear definition of the relative right of a power project to reservoir water in the upper reaches of the stream as against the riparian owner's use in the lower reaches of the stream. This situation injects an uncertain element in the costs of water-power projects, and has, in some instances, caused expensive litigation and additional capital expenditures to satisfy riparian claims. The other factor is that to the public mind, and particularly to the political mind, water power costs little or nothing. Therefore, not realizing that utilization of falling water in the development of power often entails an investment per unit of capacity many times that which is involved in steam plant production, there is always the danger of unjustifiable political attack, on the theory that the power company should be prevented from getting for nothing that which belongs to the public. If it were generally understood that it is as much a manufacturing operation to make electricity from falling water as to make it from fuel, this second factor would not militate against water power. Steam plant production is immune to both of these factors of legal uncertainty and interference by political agencies, and should for these reasons be more attractive for utilitiy operations, even at costs slightly in excess of water power.

The trend, therefore, of production for utility systems in southern California is definitely toward the use of steam generating equipment for additional plant expansion, and has been so for the past five or six years, to an increasing degree. While low fuel prices at present levels contribute to the influence in favor of steam production, this element of cost is not so important a factor as it once was, because of the high fuel efficiencies obtainable from modern plants. Hence, the modern steam station is less vulnerable to rising fuel prices than was its less efficient predecessor. The Southern California Edison Company, Ltd., in carrying into execution this policy of steam generation, has expanded its steam capacity since 1923 by 40,000 hp. and has initiated a steam construction program, to be carried out as the load may require, that contemplates the installation of six additional steam turbines, each of 134,000 hp. capacity, in its Long Beach steam plant No. 3, which now has in operation two such machines, making the ultimate capacity of this one station in excess of 1,000,000 hp.

The present situation, which favors steam production in preference to water-power development as a source of supply to the power markets of southern California, based as it is on the fundamental cost factors involved, does not appear to be of temporary character. Under present conditions, the cost of steam power is less at all usable load factors than the cost of power from the cheapest undeveloped hydro project available to southern California, not ignoring the results expected from the proposed Boulder Dam project.

With the tremendous oil and natural-gas resources of southern and central California, offering a continuation of a favorable fuel supply, supplemented by practically inexhaustible resources of coal located in adjacent states and obtainable at reasonable prices, together with the prospect of still further economies in steam generation, there is a very good indication that conditions will continue to favor steam generation for an indefinite future period.

Coolidge Dam
One of the most recent irrigation-power projects in the West. The power house is in one of the recesses

Government Ownership from the Taxation Angle

By EDWARD N. HURLEY

Hurley & Company, Chicago

IF A VOTE were taken tomorrow on the question of turning over electrical service to political agencies, there is no doubt that the majority for the present system would be overwhelming. However, it will not do for the electric light and power industry to indulge in any false sense of security because of the present state of public sentiment. The merest amateur in politics who knows how legislative bodies sometimes act is aware of the fact that a combination of special local or economic interests may at any time override unorganized and silent public sentiment. The failure or inefficiency of many of our government enterprises, such as canals, waterway improvements and flood control, is to be attributed to the fact that "log-rolling" rather than engineering science determined the execution of the projects.

The political system which might harass the electric light and other power industries is responsible for the same conditions which contribute greatly to the failure or inefficiency of government enterprises once they are launched.

Capital expenditures must be made wisely and with justification

The governor of one of our states not long since pointed out that subsidizing the highways by the national government had induced a number of counties in his state virtually to bankrupt themselves by highway construction. As soon as it became known there that the national government would pay one-half of the cost of the highways the responsibility of the local officials was cut in half, with the result that extravagance ran riot. Roads were built which were not needed. Taxpayers of those counties now have an enormous burden to carry for years to come.

We are always being told about the capitalization of private enterprise. That is something which is easy to talk about because the facts are matters of public record, accessible to anybody. The capitalization of government enterprise, or what is equivalent to capitalization, is never expressed in the form of marketable securities listed upon public exchanges; but the capital burden is always there. The taxpayer cannot escape it, short of governmental repudiation.

The mistakes of private enterprise are corrected, if in no other way than by the drastic processes of bankruptcy, where management has been unsound or financing has been reckless. The burdensome effects of such corrections are visited upon relatively small groups, usually responsible in some degree for the errors made. The mistakes of governmental enterprise may never be corrected. They may be charged upon millions of innocent taxpayers for generations to come—perhaps for centuries.

Could government raise ten billion?

Last year's estimated figures on the capitalization of the electric light and power industry—that is, of the operating companies with which the worker and consumer deal and whose rates are regulated by the states—are as follows:

Stocks	$4,825,000,000
Bonds	5,150,000,000
Total	$9,975,000,000

There are, therefore, in round figures, $10,000,000,000 worth of stocks and bonds issued on the operating companies, representing a capital investment of this amount made by the thrifty people of our country. They should receive a fair return upon their money, and to attract additional capital total earnings should be at least $700,000,000 annually. Who can doubt that with the ever-increasing demand for more and better service and the surprising obsolescence of old methods and equip-

ment another $10,000,000,000 worth of plant will have to be provided within the next decade? I base this statement upon the present annual rate of investment and construction. My estimate very likely will fall far short of the actual amount, because the electrical industry is just entering upon a widespread extension of service to the farms of the United States.

I know of no government operation of a commercial nature which is yielding 7 per cent upon the actual value of the property devoted to the purposes of the operation. A government enterprise is hailed as a success if it avoids a deficit and actually takes in more money than it pays out.

If government now owned the existing properties of the electric light and power companies, would the responsibility and the burden of $700,000,000 annually be added to those burdens already on the shoulders of the taxpayers, or would the consumer pay it? If every locality were to be provided with all the services that it would demand and seek by the use of all its political power, localities which can use electric power in large volume would be paying through taxation for the overexpansion and facilities in communities which have no volume demand. Under such circumstances, is it possible to conceive that the voters or their representatives would authorize the raising, through taxation, of another $10,000,000,000 in the ten years immediately ahead of us?

Legislators becoming taxation-wise

This is not conjecture. It is political common sense. Certainly it has not escaped the notice of you gentlemen that in the last three or four years city after city and state after state have turned thumbs down on bond issues, while legislators have refused to authorize bond issues for anything without popular referenda. If it had been necessary to raise the capital for the electric light and power industry of this country by popular referendum, a very small part of that which has been raised by private financing would have been secured.

I really wish to pay a merited tribute to the American legislators who are "taxation-wise." In my many contacts with Congress, as well as state and local legislative bodies, I have been profoundly impressed with the fact that in making appropriations the large majority of legislators try to be careful with the public's money. Extravagance in public enterprise is the fault of administrative and spending bodies rather than of those making the appropriations. Once a government board is established and has acquired a payroll, it becomes, *ipso facto*, a lobby bent upon securing more funds.

I believe that the leaders in this industry should take cognizance of the spirit of economy and honesty manifested by the large majority of legislators and should present this question of government ownership to them in its fundamental aspects of finance and taxation.

What sound policies mean to the taxpayers should be the message of the industry to the legislative bodies of the country. The leaders should apprise themselves of the remarkably keen grasp which our senators and congressmen have of the multitude of perplexing problems with which they are confronted day in and day out. Our nation's legislators are among the hardest-working men in America. The leaders of the electrical industry are better qualified than are most other industrialists to reduce public problems to terms of dollars and cents, costs and taxation.

From this background does there not naturally emerge a demand for more frequent, freer and franker contacts between chairmen of boards and presidents of the great electric light and power corporations and our senators and congressmen in Washington? I am more and more persuaded that there has been too much delegation of this duty by the executives of this industry. There has been too much reliance upon the legalistic aspects of the situation, on the one hand, and too much credulity upon the part of our executives as to the alleged miracles which can be worked by some who profess to be experts in public psychology. A few open discussions in plain business terms by a two-fisted executive of the industry, on the one hand, and senators and congressmen, on the other, would clear away a dense cloud of misapprehension, some of which has been developed by interested outsiders who have their own mess of fish to fry.

Market Stimulation Still Major Factor in Offsetting Rising Costs

TREMENDOUS investments have been made, and must continue to be made, for facilities to conduct business. To protect these investments, we must bring about, through group teamwork, greater diversification in the distribution of our product by intensive development of new markets that will improve load factor.

If we expect to obtain greater consumption per unit of industrial power and domestic service, certain handicaps to our commercial progress must be intelligently dealt with, namely, adequacy and price of wiring, rate structures not sufficiently conducive to broad promotion of electricity, and the price and quality standards of energy utilization equipment.

The principal prerequisite for market building is the maintenance of a high standard of service, courteously rendered, and this means something more than mere availability of electrical energy. It means maximum availability of energy at rates economical for both the consumer and the company; it means adequate and reasonably priced wiring, and it means suitable energy-consuming utilization equipment, readily obtainable at satisfactory prices.

MARSHALL E. SAMPSELL,
Chairman N.E.L.A. Commercial Section.

Ten Popular Economic Fallacies

By MERLE THORPE

Editor Nation's Business

NO INDUSTRY has more popular economic fallacies built around it than the electric light and power industry. Ten of the most fallacious are:

1. That water power, God-given, runs forever and costs nothing to produce.

The fact is that modern steam plants can produce electric power cheaper than hydro-electric plants, with few exceptions. Engineers assure us, for example, that before Boulder Dam power can be delivered to Los Angeles steam power will undoubtedly be produced there more economically. Relative efficiencies of water and steam power have rapidly changed, and steam power continues to improve in efficiency.

* * *

2. That municipal operation is better for small communities.

The reverse is true. Cities with private electric power, with few exceptions, are growing faster industrially than small cities with municipal plants. In the past five years cities of less than ten thousand attracted 26 per cent of all branch factories established, and more than half the new plant locations and relocations went to the smaller cities. The important factor in this movement was the dependability of electric power brought about by interconnected electrical systems.

* * *

3. That the utilities are becoming too big.

It takes more money to build a Panama Canal than a drainage ditch in Idaho. You cannot buy generators in a ten-cent store. Eleven billion round, hard iron dollars are necessary from somewhere to furnish us two billions in power and light each year. Bigness also implies brains and ability not only to attract this money, but to administer it in such a way as to keep the confidence of those from whom more money will have to come if the industry is to provide light for the ten million homes now unlighted by electricity.

4. That electric power and light has no competition.

On the contrary, raise power rates 10 per cent and the factories of the country would disconnect tomorrow and make their own power. With the loss of the industrial power business, constituting 60 per cent of the whole, domestic rates would have to be doubled.

* * *

5. That bigness, under control of a few men, if they were to abuse their power, would mean that the public would have no redress.

This is an anticipated fear and is based on the anticipated failure of democratic government itself. Public opinion still rules.

* * *

6. That regulation by men in Washington will serve the citizen of Four Corners better than state and local regulation.

This is a fallacy based on the assumption that a man who goes to Washington suddenly becomes endowed with more intelligence, more ability and better understanding of local conditions.

* * *

7. That centralization of regulation at Washington will make for decentralization of industry, to the benefit of small communities.

The reverse is true. General regulations fixed at Washington, and the effort to apply them to all local communities, will prevent a local community from developing and promoting its own peculiar opportunities. The economic freedom of individual cities would be endangered.

* * *

8. That there would be less politics in government operation than in private operation.

This is reverse English. Government operation is inevitably political operation, as every experience in every country and industry has shown. There are no exceptions.

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9. That public ownership and operation will produce better service at lower cost.

If the public will take into account taxes, depreciation and other items which government bookkeeping always forgets, but which expenses the citizens must pay, the real costs will show that private incentive still remains the greatest assurance of efficiency of operation. Moreover, government is notoriously slow in finding and adopting new inventions.

* * *

10. That Citizen John Jones would get more courtesy and prompt action in his relations with a city, state or federal bureaucracy than with a private company.

No one who takes the time to recall his own experiences will agree to this paragraph.

What's Back of Attack on Utilities?

By BERNARD F. WEADOCK
Special Counsel for Utilities

ARE WE, as citizens, willing to surrender to the federal government the inherent power of the states and municipalities in order that material may be furnished as fuel for the conflagrations of "isms" now raging in Washington?

Our business is local. The man in Oshkosh is not concerned with what the rates may be or who the people are who run the plant in Kalamazoo. What your customers want and are entitled to is excellent service at reasonable rates. A resolution of the local governing body will bring quick and complete relief from any justified grievance. There cannot be, from the very nature of the business, any necessity for or justification of a federal commission to regulate or control this business.

The people who complain of your service are not your customers. The complaints come from people outside of the communities you serve. They come from distant places and compose an "unholy alliance," seeking to advance their political or economic theory and retard and eventually destroy your business. A correct estimate of the number of people in this alliance is conservatively placed at four thousand, none of whom has the public interest at heart.

Every one is entitled to his own political, economic and religious belief, but when the manifestations of any set of men are destructive of American principles and industry, we must choose between their principles and our government. It is not the belief which is dangerous. It is what is done under its banner to get recruits. When one assails my character to profit thereby, I'll fight. Your characters, as owners, managers, operators and citizens, are being daily assassinated in the maelstrom of the one-sided "power war." If the smallest fraction of what this crowd says about you is true, you should be in some jail.

The organizations to which I refer are the League for Industrial Democracy, the Public Ownership League of America, the National Popular Government League, the People's Legislative Service and the Socialist party. The individuals affiliated in engineering, controlling and dominating this destructive group are Carl D. Thompson, H. S. Raushenbush, Judson King, H. Laidlor, Basil Manly, Mercer Johnson, McAllister Coleman, Norman Thomas and others. Certain well-known senators of the United States and members of the House of Representatives have apparently been misguided in their co-operation with these people.

The goal to which they are directing their nefarious activities relates to the abolishment of all banks and the substitution of the postal service of the United States; government ownership of coal, oil, ore, steel and power; government ownership of telephone, radio, telegraph and express companies; government insurance of all kinds; government ownership of ships, railroads and "many businesses now considered private."

The dominating characters in the several organizations are leading members of the national Socialist party. For instance, the Intercollegiate Socialist Society, which was organized in 1905 to spread the gospel of socialism in the universities of the country, changed its name to the League for Industrial Democracy in 1920, and the leaders —Laidlor, Thomas and Raushenbush—are prominent in the councils of the national Socialist party. The first name adopted indicated its purpose. Does the second? The People's Legislative Service shows as among the main factors William H. Johnson, who is also an active member of the national Socialist party, and Carl D. Thompson, who founded the Public Ownership League in 1914 and at that time was information director of the Socialist party, and among its influential members are many of those active in that party. The National Popular Government League, in which Charles Edward Russell, as well as Judson King, is a mighty influence, is closely associated with the directing heads of the Socialist party. All of these organizations work for the common

purpose of abolishing private business and establishing government ownership and control by the workers of all basic industries.

The same societies originated the idea of government-owned railroads in this country. They say that when they get control of power they then will select the next basic industry for their attacks.

In order to attain their objectives, the groups have affiliated by interlocking control and systematically dividing the work along different lines. One group spreads the doctrine in colleges and universities, another group spreads publicity, another lobbies, and still another campaigns for municipal, state and federal ownership and "democratic control."

To spread their gospel they first endeavor to create a political issue.

As far back as 1920 the parent organization included in the platform the national ownership and democratic management of railroads, express companies, banks, insurance, steamship lines, telegraph, mines, oil wells, power plants, radio, elevators, packing houses, storage plants and all industries operating on a national scale. That they have been successful in spreading this gospel is best evidenced by the publicity they have obtained and the recognition of the subject by the two major political parties.

They have either great influence with governmental bodies or else governmental bodies do not know them in their "working clothes." In one instance they say the Interstate Commerce Commission recommended them to the city of Boston to "assist" the city in solving its traction question. They have deliberately and maliciously distorted facts so ingeniously as to render difficult the pointing out of the falsehoods. They have called meetings of senators and representatives in the public office of a United States senator and there have advanced their scheme and laid out their campaign for public ownership of private business.

They have drafted bills for introduction into Congress adversely affecting our business. They have placed misleading and deceptive material in public documents and then distributed them in franked envelopes at public expense. They have kept a roll call of votes of senators and representatives, to coerce and intimidate those gentlemen in the execution of their public duties. They have used their influence with certain members of the Federal Power Commission to prevent the issuance of permits and licenses. They lobbied for and obtained the present investigation of this industry to get publicity in their concerted plan of socialism.

As a further move in their scheme of socialism they have held "power conferences" throughout the nation and invited office holders, including United States senators, to attend. One was presided over by a United States senator. They have campaigned "in and out of season and in every state of the Union."

This group has made the assertion that it can and does now control the legislation of the nation and predicts that by 1932 it may be able to elect a President of the United States.

They have spread their lies about Muscle Shoals, Boulder Dam, the Ontario Hydro and the St. Lawrence. Muscle Shoals has been kept before the public for ten years as a great public question, when in reality it involves less capacity than exists in many cities. Nowhere do they say that the Alabama Power Company gave to the government for $1 lands and other property that had cost the company about $500,000 nor that afterward the same government fined the company $500 for reproducing the government check in an advertisement.

The public superpower bill drafted by them and introduced into the Senate of the United States at their dictation would set up a plan not feasible of operation. It contemplates tying all of the municipal plants and the federal plants into one system, overlooking entirely that thousands and thousands of miles lie between these plants, although the efficient limit of transmission is not in excess of 300 miles.

They have entered the political arena of every state in the Union except two. In one state they participated in an attempt to incorporate into the law a provision that in taking over the private companies' property they would pay the bondholders in bonds of the state, which would expire upon the death of the holder, thus rendering such property uninheritable.

In a studied and well-laid plan to draw public attention they search out municipalities and inaugurate campaigns against the local companies, and they boast that they can send to any point in the United States in 24 hours a representative to conduct a "fight." They have organized municipal leagues which include city officials and some prominent people who not only are ignorant of the affiliations of the organizations of which they are members but who may be carried away by the prejudice or malice that these people engender.

They say that they would "wipe out the entire Constitution of the United States and make a new one from start to finish." They denied this statement, but I personally interviewed the interviewer, Frederick Boyd Stevenson, editorial writer of the Brooklyn *Eagle*, who in a letter to me reaffirmed the accuracy of the statement.

They have gained access to more than 130 universities, including Yale, California, Michigan, Amherst, Vassar and Pennsylvania, and lectured upon the abolition of private business and substitution of public ownership. They supply students in high schools and colleges with material. Their textbooks are in schools. They have lectured and worked in primary and high schools, in Y.M.C.A.'s, in churches, in "Pioneer Youth" camps, in state teachers' colleges and in labor colleges. They have co-operated with the communists. They will "play with" any liberal body which will give support to their doctrines. They say, "If superpower cannot be socialized promptly, the whole cause of industrial democracy will be indefinitely delayed."

We have done little or nothing to counteract these attacks, yet we are criticised by some for what we have told the public.

It is time to awaken—time to realize the situation.

All American industry is vitally interested in this situation. It must consider what it desires to do in order to protect its property from the malicious and vicious attacks of those who would destroy this property and our existing government.

American citizens have borne arms and without bands or flurry have gone through unheard-of dangers to save democracy. The strength, courage and bravery of all Americans is needed right now to save our own democracy from enemies within its gates.

Men of the Industry

W. H. Thomson, Jr., Vice-President of Texas Utility

W. H. THOMSON, JR., for six years assistant general manager of the Texas Power & Light Company, has been elected vice-president of that company. He will continue as assistant general

manager. Joining the Texas Power & Light Company at the close of the World War, Mr. Thomson renewed an association with J. W. Carpenter, president of the company, that originated in Corsicana when both were members of the organization operating the Corsicana Gas & Electric Company and the Corsicana Transit Company.

Mr. Thomson was commissioned an ensign in the U. S. Navy immediately after his graduation from Cornell University of 1898. He spent several years in Corsicana following military service in the Spanish-American War before affiliating himself with the American Light & Traction Company, serving in various capacities in St. Paul, Fargo and San Antonio. He returned to Texas as assistant general manager of the San Antonio Gas & Electric Company and the San Antonio Traction Company. Between 1910 and 1916 he was chief operating engineer of the Illinois Traction Company and general manager of the Des Moines Electric Company. For a brief period he was general manager of the Kansas City Light & Power Company, terminating that connection to serve overseas. Upon his return to civilian life he became assistant to Mr. Carpenter, at that time vice-president and general manager of the Texas Power & Light Company. Early in 1924 he was appointed assistant general manager.

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THOMAS A. EDISON has returned to his home at West Orange, N. J., after having spent the winter in Fort Myers, Fla., where he devoted considerable attention to rubber tests, in which he recently has expressed great interest.

HARRY C. ABELL, an outstanding figure in the electric light and power field, was recently elected a director of the United States Chamber of Commerce. Mr. Abell is a vice-president of the Electric Bond & Share Company, Electric Power & Light Company and New Orleans Public Service Company. In addition, he is president of the National Power & Light Company and chairman of the boards of the Memphis Power & Light Company, Memphis Street Railway Company and West Tennessee Power & Light Company and an officer of other companies.

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OBITUARY

WALTER W. GINGRICH, formerly vice-president and general manager of the Erie (Pa.) County Electric Company, died suddenly at his home in Erie, May 6, in his sixty-fifth year. Mr. Gingrich had become associated with the Erie County Electric Company as assistant to the president and shortly thereafter was elected vice-president in charge of finance. He resigned as vice-president and general manager early this year, but continued as a member of the company's board of directors until his death.

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WILLIAM H. BRISTOL, inventor and president of the Bristol Company of Waterbury, Conn., died June 18 at New Haven Hospital in his seventieth year. He had been ill for several months. Professor Bristol was widely known for his instruments, which recorded pressure, temperature and electricity, as well as for his steel belting apparatus, sound-amplifying and talking film apparatus. One of his most noteworthy inventions was the Bristolphone, an instrument which synchronized sound and action in motion pictures. A native of Waterbury and a graduate of Stevens Institute of Technology, Professor Bristol joined the teaching staff of his alma mater. He founded the Bristol Company in 1899. He was awarded the John Scott legacy medal by Franklin Institute in Philadelphia, a medal and diploma by the Chicago Exposition in 1893 and received similar awards from the Paris Exposition in 1900, the St. Louis Exposition four years later, and the grand prize of the Panama-Pacific Exposition in 1915. He was a member of many scientific societies, including the American Society of Mechanical Engineers.

Miles W. Birkett

MILES W. BIRKETT, vice-president and general manager Washington Water Power Company, Spokane, died June 13 from complications following an oper-

ation for appendicitis. A graduate of the University of Wisconsin in electrical engineering, Mr. Birkett entered the employ of the Washington Water Power Company in July, 1908. In 1922 he became general manager of the company, and the following year he was elected a vice-president. He had been active in the affairs of the Northwest Electric Light and Power Association and last month was elected president of that organization.

Financial and Statistical News

REFLECTING the current status of one phase of the electrical industry, the volume of electrical manufacturing for May shows a drop from the previous year's corresponding month for the first time in 2½ years. From a standpoint of uncertainty as to probable stock market and business trends, this week seems to mark a peak. Most of the brokerage houses recommend caution but have little or no constructive advice to offer.

——UTILITY COMMON STOCKS have fully shared the recent liquidation movement. A representative group now stands at 88 against 58 at the low point of the fall break and a high this year of 122.

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New Capital Issues

DURING THE WEEK ENDED June 19 two offerings were made by electric light and power companies of Kansas. The Kansas Power & Light Company issued first mortgage gold bonds, series B, to the amount of $2,214,000, the price being 96 and interest, yielding about 5.27 per cent.

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United Power & Light Corporation (of Kansas) made an offering of first mortgage twenty-year 5 per cent gold bonds, series B, at 96½ and interest, yielding 5.30 per cent, a piece of financing involving a total of $1,500,000.

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American & Foreign Power Company, Inc., issued 250,000 shares of cumulative $6 preferred stock at $98.50 a share and accrued dividend, to yield about 6.09 per cent. Proceeds will be used for general corporate purposes. Based on current quotations on the New York Stock Exchange and the New York Curb Exchange, the indicated market value of the company's outstanding second preferred stock, series A, common stock and option warrants is more than $600,000,000.

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First mortgage gold bonds of the Central Arizona Light & Power Company were offered to the amount of $7,500,000 at 96¼ and interest, yielding 5.25 per cent.

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April Light and Power Earnings Exceed Last Year's

THE combined gross operating revenues of electric light and power companies in the United States for April, estimated at $175,900,000, exceeded by approximately 3 per cent the corresponding revenues in 1929. The total was somewhat less than in March, in accordance with the normal seasonal change, but the average daily revenue was greater—$5,720,000 in March, $5,860,000 in April. Compared with 1928 there was an increase of 12 per

Western Mississippi Valley States lead in revenue gains

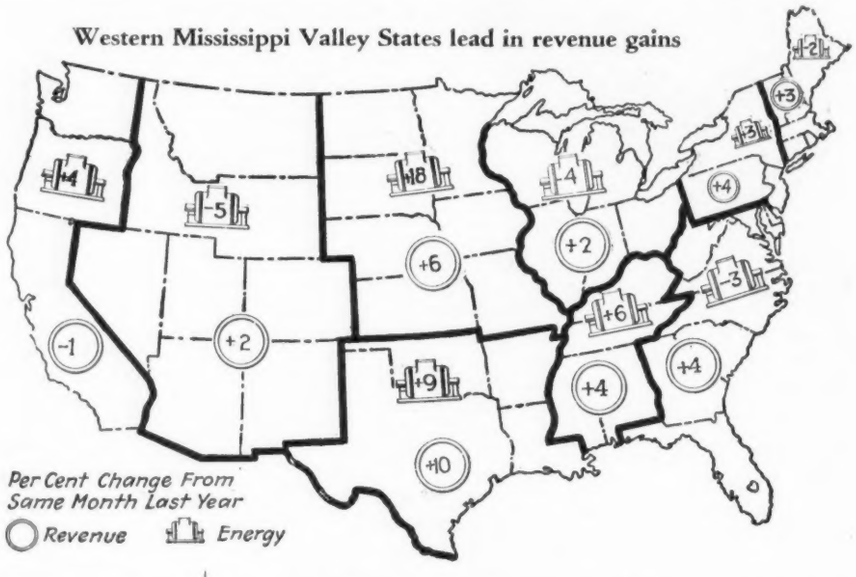


Table I—Central-Station Financial Operations in the United States[1]

Compared with Corresponding Month of Previous Year

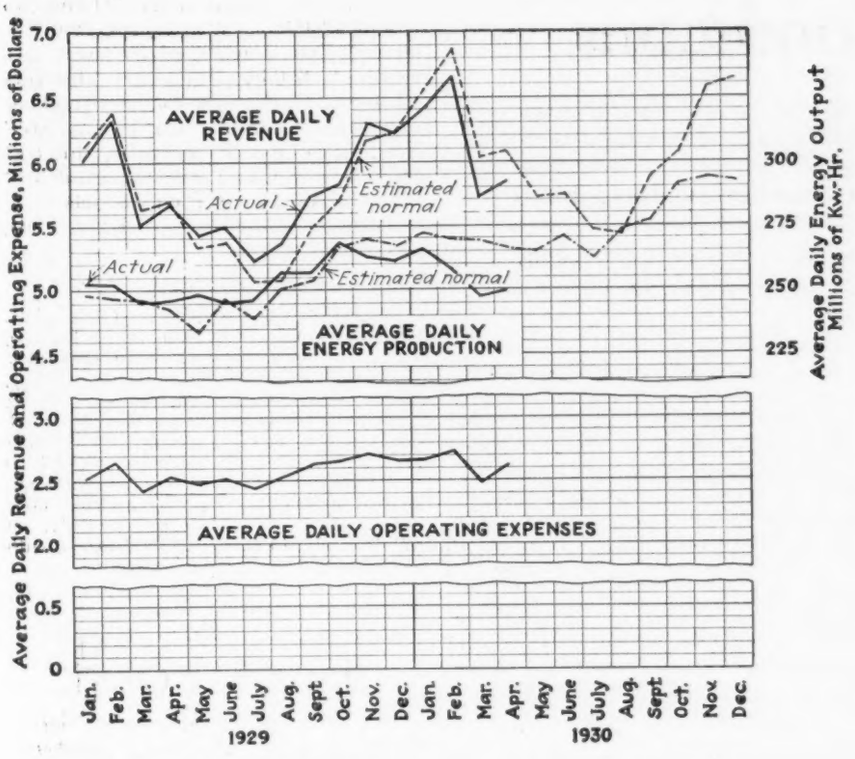
Month	Total Gross Revenue from Sale of Energy*			Total Operating and Maintenance Expense†		
	1930 Thousands	1929 Thousands	Per Cent Inc.	1930 Thousands	1929 Thousands	Per Cent Inc.
January	$198,300	$187,000	+6.0	$81,400	$77,800	+4.7
February	185,800	176,800	+5.0	77,300	74,700	+3.8
March	177,100	170,500	+3.9	77,700	75,000	+3.6
April	175,900	170,900	+2.9	78,400	76,150	+2.9

Table II—Central-Station Fuel Consumption in the United States‡

Compared with Corresponding Month of Previous Year

Month 1930	Coal		Oil		Gas	
	Short Tons	Per Cent Increase	Barrels	Per Cent Increase	Thousands Cubic Feet	Per Cent Increase
January	3,686,525	—2.9	1,070,777	+17.7	9,807,514	+23.7
February	3,131,026	—7.4	675,807	—19.0	9,182,141	+28.1
March	3,156,064	—3.3	600,994	—13.8	9,241,962	+14.3
April	2,971,908	—5.4	557,231	— 9.2	9,503,422	+21.7

*Aggregate gross revenue from consumers and from other utilities for energy for resale, involving a certain amount of duplication.
†Do not include interest, taxes, depreciation or sinking fund, with some unavoidable exceptions. ‡As collected by U. S. Geological Survey.
(1) The financial statistics have been revised as explained on page 665 of the issue of March 29, 1930.



Reduced industrial activity keeps energy use below normal

cent. Operating expenses kept pace with the moderate growth in revenue.

The total energy output was also larger than in April, 1929, but the ratio of increase was smaller than that for revenue, as is evident from Tables I and III; the output was 7,471,000 kw.-hr. All of these figures are subject to slight corrections upon receipt of more complete returns. A larger portion of the output than in March came from water power; it amounted in April to 41 per cent.

As to fuel, compared with the corresponding month in 1929 the consumption of coal decreased about 5 and of oil 9 per cent; gas, however, increased nearly 22 per cent (Table II).

Regionally the greatest gain in revenue, compared with 1929, occurred in the West South Central States, 10 per cent; the West North Central group also notably exceeded the average for the country as a whole. The East North Central region makes a better showing than in March as to revenue, but the 3 per cent decrease in output indicates that the industrial use of power is still subnormal. It should be recalled, however, that this area experienced an unusual gain in the spring of 1929 over 1928. Further details as to regional revenue and output, the latter divided with reference to its source, are given in Table IV and on accompanying map.

Table III—Energy Output of Central Stations in the United States

Compared with Corresponding Month of Previous Year

Month 1930	Generated, Thousands of Kw.-Hr.*						Purchased for Resale	
	Total		Hydro		Fuel			
	Generated	Per Cent Inc.	Generated	Per Cent Inc.	Generated	Per Cent Inc.	Thous. Kw.-Hr.	Per Cent Inc.
January	8,154,531	+5.5	2,790,505	+ 9.4	5,364,026	+3.6	1,770,000	+17.1
February	7,177,064	+2.8	2,581,538	+11.0	4,595,526	—1.3	1,567,000	+ 5.5
March	7,669,520	+2.2	3,080,493	+ 3.0	4,589,027	+1.6	1,722,000	+16.0
April	7,471,035	+1.2	3,070,868	— 0.7	4,400,167	+2.4	1,717,000	+17.0

Table IV—Regional Operations, Revenue and Energy Output in April, 1930

Compared with Corresponding Month of Previous Year

Region	Estimated Revenue[1]		Energy Generated, Thousands of Kw.-Hr.*					
			Total		Hydro		Fuel	
	Thousands of Dollars	Per Cent Inc.	Generated	Per Cent Inc.	Generated	Per Cent Inc.	Generated	Per Cent Inc.
United States	175,900	+ 2.9	7,471,035	+ 1.2	3,070,868	— 0.7	4,400,167	+ 2.4
New England	17,360	+ 2.7	473,384	— 1.8	228,337	— 2.8	245,047	— 0.7
Middle Atlantic	45,870	+ 4.4	1,746,940	+ 2.8	585,952	+ 4.7	1,160,988	+ 1.9
East North Central	44,610	+ 1.6	1,826,598	— 3.5	224,315	— 9.3	1,602,283	— 2.7
West North Central	14,550	+ 6.4	477,780	+17.6	134,702	+ 1.8	343,078	+25.2
South Atlantic	19,360	+ 4.1	1,003,121	— 3.0	627,840	— 4.9	375,281	+ 0.5
East South Central	5,880	+ 3.5	286,884	+ 6.1	239,225	+ 1.1	47,659	—13.7
West South Central	9,340	+10.0	407,896	+ 8.5	6,675	—20.4	401,221	+ 9.0
Mountain	4,260	+ 1.6	292,623	— 4.7	254,753	— 4.8	37,870	— 0.5
Pacific	14,670	— 0.6	955,809	+ 3.8	769,069	+ 0.3	186,740	+21.3

*As collected by U. S. Geological Survey.

(1) The revision of the statistics on revenue is discussed in the issue of March 29, 1930, on page 665.

NEWS BRIEFS

Italo-Argentina Electric Company reports for 1929 gross profits from operations and other sources of 14,225,512 Argentine pesos (about $5,405,500 at current exchange), compared with 12,800,605 pesos (about $4,864,230) in 1928, an increase of more than 11 per cent. Net profits after all reserves and general expenses were 5,860,836 pesos, against 5,824,398 pesos the year before.

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Holders of 7 per cent cumulative preferred stock of the Lockport Light, Heat & Power Company have received the right to exchange their stock for $1.60 interest-bearing allotment certificates of the Associated Gas & Electric Company at $110 a share and accrued dividend for the preferred stock and $29 a share and accrued interest for the certificates.

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Pennsylvania Public Service Commission has approved the merger of the Pennsylvania Power Company, the Harmony Electric Company and the Peoples Power Company, subsidiaries of the Commonwealth & Southern System.

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Directors of the Philadelphia Company have declared an extra dividend of 75 cents a share and the regular quarterly dividend of $1 a share on the common stock, both payable July 31 to holders of record July 1.

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American & Foreign Power Company, Inc., has received word from Shanghai that during a customer-ownership campaign just completed there has been sold to residents of the International Settlement and other sections of Shanghai 80,000 shares of Shanghai Power Company preferred stock. The stock sold is of no par value and carries dividends at the annual rate of 6 taels, payable in Shanghai taels.

Market Conditions

ELECTRICAL equipment business approximates low levels for the year. Retail sales on the Pacific Coast are probably 10 per cent below corresponding totals for last year. Middle West business is slack, but a substantial volume for the early fall is anticipated.

——EASTERN SALES VOLUME IS WELL SUSTAINED at levels slightly exceeding last year's.

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EASTERN

—A LEADING MANUFACTURER *of heavy electrical equipment sums up the situation in the Eastern district by saying that the volume of orders now being placed compares favorably with business at this time last year. With sizable commitments for the week, central stations as well as industrial interests continue active with inquiries and June account bids fair to be more favorable at the close than when the month opened.*

—REFRIGERATOR DEMAND LEADS *all other domestic equipment sales and there is a good turn-over in that line.*

The Westinghouse Electric & Manufacturing Company has secured an important order from the Union Electric Light & Power Company, St. Louis, for six waterwheel generator units, each of 23,888 kva. rating; two similar generators of 3,000 kva. capacity, seven 150-kw. motor-generator exciter sets, and auxiliary equipment for its proposed hydro-electric power development on the Osage River, near Bagnell, Mo., totaling about $1,000,000. The General Electric Company will furnish two turbo-generator units, each of 10,000 kw. capacity, with surface air coolers and accessories for a floating power plant of the New England Public Service Company, which is now reconditioning a former government-owned yessel for this purpose; four marine type boilers will be of Babcock & Wilcox design.

There is a more active demand for industrial motors, with the iron and steel plants, chemical and food product factories leading in call; the chemical and affiliated industries, particularly, show excellent prospects for early orders. A manufacturer of air compressors in New England has placed a contract with a New York maker for a quantity of industrial motors to cost $30,000. A producer of electric washing machines in northern New York has given a commitment to the same maker for fractional horsepower units to an amount of $35,000. A manufacturer of electric heating equipment for industrial plants reports expanding demand for installations from a number of lines of industry, with prospects growing strong for active fall account in this line. Another maker of electric heating apparatus in Ohio is developing capacity production in view of forthcoming demand during the next 60 to 90 days. Business in wire and cable shows little change and orders at present are limited. A manufacturer of electric refrigerators reports an increase of over 100 per cent in orders as compared with last spring, and the plant is running to capacity.

CONSTRUCTION PROJECTS

Commercial Solvents Corporation, New York, plans acid plant at Peoria, Ill., to cost $500,000, and will build addition to plant of Commercial Pigments Corporation, a subsidiary at Baltimore, Md., to cost $400,000. Fisher Body Corporation, Detroit, Mich., has plans for automobile body plant at Tarrytown, N. Y., to cost $600,000. Standard Oil Company of New Jersey, New York, plans storage and distributing plant at Kreischerville, S. I., to cost $1,000,000. Freeport Texas Company, New York, plans expansion program at sulphur properties at Freeport, Tex., to cost over $400,000. Penn Central Light & Power Company, Altoona, Pa., contemplates hydro-electric power plant on Juniata River, near Huntingdon, Pa., to cost over $1,500,000. Gulf Refining Company, Pittsburgh, plans oil storage and distributing plants at Louisville, Ky., and Rochester, N. Y., each to cost over $300,000. General Purchasing Officer, Panama Canal, Washington, D. C., will receive bids until July 7 for Diesel engines (Panama Schedule 2566.)

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SOUTHWEST

—THERE HAS BEEN *no marked change in the general business situation since last report, although some very large contracts have been closed. Orders for stock sizes of apparatus have been considerably below normal.*

One contract is for six 23,880-kva. umbrella type generators for attachment to water turbines, two 3,000-kva. waterpower units for driving plant auxiliaries and seven 150-kw. motor-generator sets for excitation, all to cost $1,100,000. Orders for the same plant include ten single-phase, 20,000-kva., air-cooled transformers, 13,800 to 132,000 volts, to cost $325,000. Other orders are for electrical equipment for 130 street cars costing $247,000. Additional substation equipment for a power company in Oklahoma includes four transformers, 6,667 kva., with circuit breakers, to cost $55,000 and wired wireless equipment with carrier current for plant intercommunication in Arkansas and Louisiana, to cost $45,000.

CONSTRUCTION PROJECTS

Skelly Oil Company, Tulsa, Okla., plans extensions in refining plant at El Dorado, Kan., and other expansion to cost over $1,000,000. Phillips Petroleum Company, Bartlesville, Okla., plans gasoline refining plant near Hobbs, N. M., to cost $700,000. Little Rock, Ark., plans airport lighting system at proposed municipal airport to cost $200,000. White River Power Company, Pine Bluff, Ark., plans hydro-electric power plant of 400,000 hp. capacity, on White River, to cost over $25,000,000, with steel tower transmission system.

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PACIFIC COAST

—POWER COMPANY PURCHASES PREDOMINATE *in the coast market. Line construction and merchandising material sales are especially brisk despite pessimistic prophecies of wholesale cuts in construction and selling personnel.*

—SALES OF METERS AND SMALL TRANSFORMERS *are lagging somewhat behind, probably because of the pooling of such supplies among the companies recently merged.*

Recent orders cover two carloads of weatherproof copper wire, sizes No. 2 to 8, for central area stock, 10,000 lb. No. 4 bare copper wire for Santa Cruz territory, two carloads pole line hardware for scattering jobs, six assorted carloads of poles, 35, 40 and 45-ft. sizes, for Petaluma, Sacramento and Pittsburg districts and a 40-mile line job in coast valley district. Los Angeles is in the market for 4,500 crossarms, principally 10-pin size. Upper San Francisco Bay is again active in industrial and residential building with a firebrick plant at Pittsburg and some governmental and much residential construction in Vallejo. Governmental work is very heavy, including pumps and motors for San Francisco for the proposed $15,000,000 dirigible base to be established either at Sunnyvale, near San Francisco, or Karney, near Los Angeles.

Railroad purchasing is featured by machinery orders, such as a 25-kva. engine-driven General Electric generator valued at $3,500 to be used in constructing the Martinez bridge for the Southern Pacific and four General Electric air compressors valued at $5,000 for electric locomotives in Sacramento val-

ley service. There is a dearth of other machinery orders. The only outstanding order covers $15,000 Westinghouse supervisory control material for Seattle. Coast retail electrical business has decreased about 10 per cent over last year. Prices are fairly steady, though with an imperceptible drift toward a low profit rate.

Curtailment program enforced by mills and allied industrials, involving closing down of many plants, has reduced motor sales to a minimum, and this condition, it is generally agreed, will continue the remainder of the summer. Central station buying, also, is very light. Motor sales reported last week include eight from 25 hp. down to two pulp and paper companies, two 250-hp. synchronous motors to a shingle mill at Shelton, twenty machines from 20 hp. down to dealers in orchard districts in eastern Washington and ten from 40 hp. down to small industrials in Seattle. Bids for a $400,000 steam auxiliary plant for Eugene, Ore., are being taken by the Water Board until July 1. Separate tenders will be accepted for eleven 50-hp. bent tube type water boilers and accessories, a 6,000-kw. turbo-generator set with accessories and a surface condenser and accessories.

City of Seattle has awarded contracts for thirteen 2,000-kw. transformers for approximately $62,000, network protectors for $21,000 and insulators and line materials for $8,000. Construction of a large pulp mill and wood conversion plant on Columbia River, adjacent to mills of Weyerhaeuser Timber Company, is projected by Northwest Paper Company.

CONSTRUCTION PROJECTS

Procter & Gamble Company, Cincinnati, Ohio, has filed plans for soap manufacturing plant at Los Angeles, Calif., to cost $3,000,000. Santa Ana, Richmond and San Jose, Calif., plan ornamental lighting systems. Seattle, Wash., plans lighting system at municipal airport, entire project to cost over $2,000,000. Columbia Valley Lumber Company, Bellingham, Wash., plans mill to cost $100,000.

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SOUTHEAST

—GENERAL BUSINESS IN THE *Southeast continues to be confined to routine requirements, with the possible exception of the demands of several utility projects through the section, according to the report from jobbers and manufacturers' representatives.*

Orders from South Carolina included substation and switching equipment to the amount of $15,000 and a carload of wire. New Orleans district purchased subway type transformers amounting to approximately $7,500. The Georgia School of Technology, Atlanta, ordered three 100-kva. transformers. A utility company in the southern part of Georgia ordered power transformers amounting to about $13,000. Another Georgia utility ordered meters amounting to $1,375, small transformers amounting to approximately $1,320, low-tension line equipment amounting to $1,750 and miscellaneous items amounting to approximately $900. A Georgia construction company ordered disconnecting switches amounting to $21,000, switchboards and primary station equipment amounting to $14,300, instrument transformers amounting to $6,000, and oil circuit breakers amounting to $3,200.

Definite indication of improvement in general business during the latter half of the year is taken from the increase in the number of inquiries coming into the various offices throughout the Southeast.

CONSTRUCTION PROJECTS

Portsmouth, Va., plans electrification of municipal pumping plant. Palmer Asbestos & Rubber Company, Chicago, Ill., plans plant at Louisville, Ky., to cost $200,000. Tennessee Electric Power Company, Chattanooga, Tenn., plans transmission lines in Carroll County. Alabama Power Company, Birmingham, Ala., plans transmission line from Chickasaw to Citronelle and vicinity, about 40 miles. Champion Coated Paper Company, Hamilton, Ohio, contemplates mill in viciniay of Mobile, Ala., to cost over $5,000,000.

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MIDDLE WEST

—CONSIDERABLE SPOTTINESS IS IN EVIDENCE *in the Middle West, with a slight decrease in the volume of business. Hand-to-mouth buying is pronounced, with a decided effort being made to limit stocks to a minimum. Successful settlement of the traction problems in the Chicago district, it is hoped, will give business a much-needed stimulus.*

It is hoped that this month will mark the end of an inactive period and business will improve the last half of the year, although indications so far do not point to much improvement for some time. Retail trade is off considerably, with a large amount of effort being exerted to stimulate summer buying. The various utility companies are proceeding on a curtailed program of expansion, doing necessary work only. There has been a limited demand for distribution equipment with a fair demand for apparatus.

CONSTRUCTION PROJECTS

Baldwin, Wis., will receive bids until June 30 for an ornamental lighting system. Little Wolf Power Company, New London, Wis., is completing plans for hydro-electric power plant to cost over $150,000. La Crosse and Stanley, Wis., plan ornamental lighting systems. Allegan City, Mich., has approved plans for municipal hydro-electric power plant to cost $300,000. Purdue University, Lafayette, Ind., has authorized plans for an electrical engineering building to cost $115,000. Youngstown Sheet & Tube Company, Youngstown, Ohio, plans mill addition to cost $2,000,000. Ford Motor Company, Dearborn, Mich., contemplates an assembling plant at Fairport, Ohio, to cost over $500,000. Montana-Dakota Power Company, Minneapolis, Minn., plans street lighting system at Kenaston, N. D. Central West Public Service Company, Omaha, Neb., plans extensions in power plant at Hot Springs, S. D., to cost $80,000. St. Paul, Minn., plans ornamental lighting system. Iowa Railway & Light Corporation, Cedar Rapids, Iowa, plans steam-operated electric power plant at Toledo, Iowa, to cost $400,000.

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NEW ENGLAND

—ORDERS FOR HEAVY ELECTRICAL *equipment receded during the past week. Small industrial motor sales are active and one prominent manufacturer reports that the sales volume to date for this district compares favorably with that of last year. Several lot orders for fractional-horsepower motors were recorded by one manufacturer; another notes steadiness in the demand for small generator sets.*

Electrical motors and control for ice making machinery were recently purchased for a new ice plant and equipment ordered for ventilating and cooling amounting to about $12,000 is noted.

Central-station supplies are spotty. Insulator sales are steady. Recently supplies for a new substation amounting to about $2,500 were ordered, and inquiries are being received for several other stations now projected for this district.

Some recession in inquiries for electric furnaces is noted, though one manufacturer reports a steady interest in small heating pot types of furnaces. Specialties among electric appliances are receiving increasing attention. During the past week orders for electrically controlled clocks amounted to over $2,000 according to one distributor. Inquiries for interior lighting for institutional type buildings are gaining.

Electrical equipment including waterwheel generators and control, costing about $1,000,000, was awarded through the district office of a prominent manufacturer to be used on Midwest hydro-electric project.

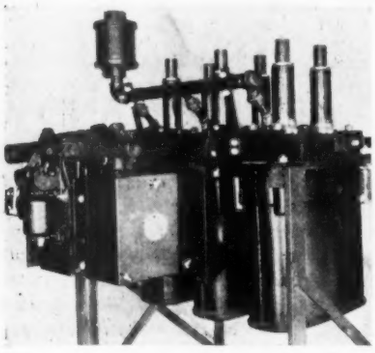
CONSTRUCTION PROJECTS

Harris Baking Company, Waterville, Me., contemplates plant to cost $100,000. Maine Public Service Company, Milo, Me., plans power dams on Sebec River, for hydro-electric power service. New England Fuel & Transportation Company, Boston, Mass., plans submarine cable lines for transmission service under Mystic River at Boston and Everett.

New Equipment Available

15,000-Volt Indoor Oil Circuit Breaker

A NEW LINE OF OIL CIRCUIT BREAKERS has been added recently by the Westinghouse Electric & Manufacturing Company. This line includes the types B-7,



B-8, B-9 and B-10 breakers, which are rated at 15,000 volts and 400 to 2,000 amp. They have been designed for indoor service only and especially for use in power plants and substations where small space is available for switching equipment.

These breakers are manually or electrically operated and are available with one, three, or four poles, single throw. They are essentially for remote-control form only, which is in accordance with the A.I.E.E. recommendation that circuit breakers for use on circuits of more than 2,500 volts be mounted away from the switchboard. These breakers are designed for truck or structural frame mounting and are readily applicable to cell mounting.

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One or More Units in Miniature Switchboard

AN INCLOSED MINIATURE SWITCHBOARD to control an electrical system from a central point is announced by the General Electric Company. This switchboard, of unique construction, involves a great saving in space. It is made up of one or more self-contained units arranged in circular formation. When these units are mounted side by side, with molding at front and back, a switchboard of uniform and neat appearance is obtained.

Each individual unit is factory built complete and is made of welded, fabricated parts. It occupies an angular space of 30 deg. so that a total of six units can be mounted in the half-circle, leaving the operator a space 4½ ft. in diameter. Space on the panel is provided for mounting twelve control key equipments, or, where less than the maximum number of instruments are mounted, two additional control equipments can be mounted for each omitted instrument.

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A NEW MODEL SCREEN for screening intake water has been announced by the Link-Belt Company, Chicago, Ill. An outstanding feature of this screen is the tray construction. It is such that each tray now has approximately 10 per cent greater depth of effective screening area. Chain wear does not affect the overlapping feature, and the openings between trays are actually smaller than the openings in the screen cloth. The drive consists of a motor with moisture-proof windings, a herringbone-gear, fully housed speed reducer running in oil and equipped with anti-friction bearings, and a suitably guarded finished steel roller chain drive to the screen headshaft.

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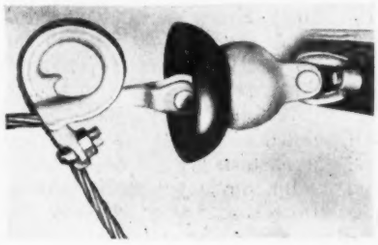
Manhole Ventilator

A MANHOLE VENTILATOR which consists of a No. 175 Coppus "Vano" blower equipped with ½-hp. General Electric universal motor, good for d.c. and a.c., the complete unit mounted on tripod with swivel joint, is announced

by the Coppus Engineering Corporation, Worcester, Mass. A diffuser guides the air so that even without canvas tubing thorough ventilation is obtained, but an 8-in. ventube, easily slipped over the diffuser outlet, is recommended. Coppus cable manhole ventilator can be carried by one person and is a ventilating, cooling and drying fan of general usefulness. Diffuser outlet can be directed downward, horizontal and upward with the help of a swivel joint.

Dead-End Clamp for Rural Lines

A LIGHT, STRONG AND ECONOMICAL dead-end clamp for farm lines, distribution circuits, substation buses, etc., has been announced by the Lapp Insulator Company, Le Roy, N. Y. This clamp is of such design as to take care of the entire range of conductor sizes frequently used for this work, thereby making possible a great reduction in



stock parts and storage charges. It has few parts to adjust, permits the conductor jumper to be trained away to a pin type insulator or other equipment and is thoroughly reliable.

This clamp is recommended for the following conductors: bare, solid No. 2 to No. 2/0 inclusive; bare, stranded No. 3 to No. 4/0 inclusive, and triple braid, weatherproof No. 6 to No. 1 inclusive. For heavier triple-braid, weatherproof it is customary to strip the insulation and clamp over the bare metal. Clamps are suitable for copper or aluminum.

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Welding Alloys Without Use of Flux

A PRODUCT WHICH MAKES NEAT, strong and dependable copper and copper base alloy joints and connects without requiring the use of a flux is announced by the Westinghouse Electric & Manufacturing Company. This product is "Phos-Copper" welding alloys. It is marketed in rod and strip form, is composed essentially of copper and from 5 to 10 per cent phosphorus, the rod form containing slightly more than the strip form.

The fluidity of the material is directly proportional to the phosphorus content. The higher the degree of fluidity, the better will be the alloying, penetrating and cementing properties at a comparatively low welding or fusing temperature. "Phos-Copper" begins to melt at approximately 700 deg. C (1,292 deg. F.) and becomes extremely fluid at 750 deg. C. (1,382 deg. F.) for the rod and 800 deg. C. (1,472 deg. F.) for the strip form.